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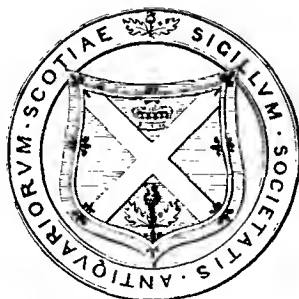
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L A W S

OF THE

SOCIETY OF ANTIQUARIES OF SCOTLAND.

INSTITUTED NOVEMBER 1780 AND INCORPORATED BY
ROYAL CHARTER 6TH MAY 1783.

(Revised and adopted November 30, 1901.)

1. The purpose of the Society shall be the promotion of ARCHEOLOGY, especially as connected with the investigation of the ANTIQUITIES AND HISTORY OF SCOTLAND.

2. The Society shall consist of Fellows, Honorary Fellows, Corresponding Members, and Lady Associates.

3. Candidates for admission as Fellows must sign the Form of Application prescribed by the Council, and must be proposed by a Fellow and seconded by two members of the Council. Admission shall be by ballot.

4. The Secretaries shall cause the names of the Candidates and of their Proposers to be inserted in the billet calling the Meeting at which they are to be balloted for. The Ballot may be taken for all the Candidates named in the billet at once; but if three or more black balls appear, the Chairman of the Meeting shall cause the Candidates to be balloted for singly. Any Candidate receiving less than two-thirds of the votes given shall not be admitted.

5. Honorary Fellows shall consist of persons eminent in Archæology, who must be recommended by the Council, and balloted for in the same way as Fellows; and they shall not be liable for any fees of admission or annual subscriptions. The number of Honorary Fellows shall not exceed twenty-five.

6. Corresponding Members must be recommended by the Council and balloted for in the same way as Fellows, and they shall not be liable for any fees of admission or annual subscriptions.

7. Ladies who have done valuable work in the field of Archæology may be admitted as Lady Associates. The number of Lady Associates shall not exceed twenty-five. They shall be proposed by the Council and

balloted for in the same way as Fellows, and shall not be liable for any fees of admission or annual subscriptions.

8. Before the name of any person is added to the List of Fellows, such person shall pay to the funds of the Society Two Guineas as an entrance fee and One Guinea for the current year's subscription, or may compound for the entrance fee and all annual subscriptions by the payment of Twenty Guineas at the time of admission. Fellows may compound for future annual subscriptions by a single payment of Fifteen Guineas after having paid five annual subscriptions; or of Ten Guineas after having paid ten annual subscriptions.

9. The subscription of One Guinea shall become due on the 30th November in each year for the year then commencing; and if any Fellow who has not compounded shall fail to pay the subscription for three successive years, due application having been made for payment, the Treasurer shall report the same to the Council, by whose authority the name of the defaulter may be erased from the list of Fellows.

10. Every Fellow not being in arrears of the annual subscription shall be entitled to receive the printed Proceedings of the Society from the date of election.

11. None but Fellows shall vote or hold any office in the Society.

12. Subject to the Laws and to the control of the Society in General Meetings, the affairs of the Society shall be managed by a Council elected and appointed as hereinafter set forth. Five Members of the Council shall be a quorum.

13. The Office-Bearers of the Society shall consist of a President, three Vice-Presidents, two Secretaries for general purposes, two Secretaries for Foreign Correspondence, a Treasurer, two Curators of the Museum, a Curator of Coins, and a Librarian. The President shall be elected for a period of five years, and the Vice-Presidents for a period of three years. One of the Vice-Presidents shall retire annually by rotation and shall not again be eligible for the same office until after the lapse of one year. All the other Office-Bearers shall be elected for one year and shall be eligible for re-election.

14. In accordance with the agreement subsisting between the Society and the Government, the Board of Manufactures (now the Board of Trustees) shall be represented on the Council by two of its Members (being Fellows of the Society) elected annually by the Society. The Treasury shall be represented on the Council by the King's and Lord Treasurer's Remembrancer (being a Fellow of the Society).

15. The Council shall consist of the Office-Bearers, the three representative Members above specified, and nine Fellows, elected by the Society.

16. Three of the nine elected Members of Council shall retire annually by rotation, and shall not again be eligible till after the lapse of one year. Vacancies among the elected Members of Council and Office-Bearers occurring by completion of term of office, by retirement on rotation, by resignation, by death or otherwise, shall be filled by election at the Annual General Meeting. The election shall be by Ballot, upon a list issued by the Council for that purpose to the Fellows at least fourteen days before the Meeting.

17. The Council may appoint committees or individuals to take charge of particular departments of the Society's business.

18. The Annual General Meeting of the Society shall take place on St Andrew's Day, the 30th of November, or on the following day if the 30th be a Sunday.

19. The Council shall have power to call Extraordinary General Meetings when they see cause.

20. The Ordinary Meetings of the Society shall be held on the second Monday of each month, from December to May inclusive.

21. Unless special arrangements to the contrary have been made, copyright of *The Proceedings* and of all papers printed therein, as well as of all illustrations, shall belong to the Society. This provision shall not apply to illustrations made from blocks borrowed from outside sources.

22. Every proposal for altering the Laws must be made through the Council: and the Secretaries, on instructions from the Council, shall cause intimation thereof to be made to all the Fellows at least one month before the General Meeting at which it is to be determined on.

Form of Special Bequest.

I, A. B., do hereby leave and bequeath to the Society of Antiquaries of Scotland incorporated by Royal Charter, my collection of and I direct that the same shall be delivered to the said Society on the receipt of the Secretary or Treasurer thereof.

General Form of Bequest.

I, A. B., do hereby leave and bequeath to the Society of Antiquaries of Scotland incorporated by Royal Charter, the sum of £ sterling [*to be used for the general purposes of the Society*] [*or, to be used for the special purpose or object of*], and I direct that the said sum may be paid to the said Society on the receipt of the Treasurer for the time being.

LIST OF THE FELLOWS, CORRESPONDING MEMBERS, HONORARY FELLOWS, ETC.

OF THE

SOCIETY OF ANTIQUARIES OF SCOTLAND,

NOVEMBER 30, 1942.

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- | | |
|--|---|
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| 1933.*AILSA, The Most Hon. The MARCHIONESS OF, Culzean Castle, Maybole. | 1936. ANDREW, Rev. HARRY, Minister of Gilfillan Memorial Church, Gilfillan Manse, Ancrum Road, Dundee. |
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| 1929. ALEXANDER, W. M., Journalist, Hillview Road, Cults, Aberdeenshire. | 1926.*ANGUS-BUTTERWORTH, LIONEL MILNER, F.R.G.S., F.C.I.S., M.I.Mech.E., Vice-President of the Ancient Monuments Society, Ashton New Hall, The Old Village, Ashton-on-Mersey, Cheshire. |
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1930. CALDER, WILLIAM M., M.A., LL.D., F.B.A., Professor of Greek, University of Edinburgh; Editor of *Classical Review*; 58 St Alban's Road, Edinburgh, 2 — *Secretary for Foreign Correspondence*.
- 1919.*CALLANDER, ALEXANDER D., Jellopitiya, Ratnapura, Ceylon.
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1923. CARMICHAEL-ARMSTRONG, Lieut.-Col., Baharoon, Brechin.
1922. CARRIERS, ARTHUR STANLEY, A.C.A., Camden Ho, Stewarton Drive, Cambuslang, Lanarkshire.
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1938. CLENDENIN, PAUL DANA (no address).
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- 1901.*COCHRAN-PATRICK, Lady, Woodside, Beith.
- 1898.*COCHRAN-PATRICK, Sir NEIL J. KENNEDY, K.B.E., J.P., D.L., of Woodside, Advocate, Ladyland, Beith.
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- 1901.*COX, DOUGLAS H. (no address).
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- 1889.*CURL, JAMES, LL.D., F.S.A., St Cuthberts, Melrose.—*Vice-President*.
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- 1925.*DAWSON, A. BASHALL The Vache, Chalfont St Giles, Bucks.
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- 1923.*DICKSON, ARTHUR HOPE DRUMMOND (no address).
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- 1930.*DUMFRIES, The Right Hon. The EARL OF, Dumfries House, Cumnock, Ayrshire.
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- 1927.*DURAND, Captain PHILIPPE, Curator of the People's Palace Museum, Glasgow Green, Glasgow, S.E., 88 Holmlea Road, Cathcart, Glasgow.
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- 1923.*ELPHINSTONE, The Right Hon. LORD, K.T., LL.D., Caithery Tower, Musselburgh.
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- 1933.*FERGUSON-WATSON, HUGH, M.D., Ph.D., D.P.H., F.R.S.E., F.R.F.P.S., 109 Montgomery Street, Edinburgh, 7.
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- 1925.*FISH, THOMAS WILSON, J.P., M.Inst.N.A., Kirklands, Dunbar.
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- 1913.*GRAHAM, ANGUS, M.A., F.S.A., Secretary, Royal Commission on Ancient and Historical Monuments of Scotland, 1 Nelson Street, Edinburgh, 3.—*Secretary*.
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- 1922.*HAMILTON, JOHN, Punta Loyola, Patagonia, South America.
1933. HAMILTON, Sir ROBERT W., Knt., F.R.G.S., The Grange, Hadlow Down, Sussex.
- 1901.*HAMILTON OF DALZELL, The Right Hon. LORD, K.T., C.V.O., Dalzell, Motherwell.
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1939. MULLER, FERDINAND, L.D.S., 46 Station Road, Blackpool.
1934. MUNNOCH, JAMES, F.R.S.E., 15 Liberton Drive, Liberton, Edinburgh, 9.
1932. MUNRO, W. A., D.Litt., 7 Laverockbank Terrace, Edinburgh, 5.
1933. MURRAY, CHARLES STEWART, 8 Hillview, Blackhall, Edinburgh.
1920. MURRAY, JAMES, J.P., Kenwood, 97 Kirkintilloch Road, Bishopbriggs, Glasgow.
1931. MURRAY, JOSEPH HENRY, Glengyle Lodge, 68 Brunsfield Place, Edinburgh, 10.
1926. MURRAY, Miss LOUISA, The White House, Anstruther, Fife.
- 1927.*NAPIER, J. G., Retired Tea Planter, 13 Lynedoch Place, Edinburgh, 3.
1933. NAPIER, JOHN WATSON, M.B.E., M.I.Chem.E., Dumfries, Birkm, Dunkeld, Perthshire.
1923. NELSON, Mrs, Beechwood, Calderstones, Liverpool, 18.
1936. NESBITT, ROBERT C., of Nisbet House, Duns—26 Tregunter Road, London, S.W. 10.
1936. NICHOLAS, DONALD LOUIS, M.A., Pine Lodge, Stanley Avenue, Higher Beblington, Cheshire.
1938. NOBLE, WILLIAM, 8 Churchhill, Edinburgh, 10.
1941. NORMAND, The Rt. Hon. LORD, P.C., Lord Justice-General, 27 Murray Place, Edinburgh, 3.
1929. NOTMAN, ROBERT CARPRAE, W.S., 15 York Place, Edinburgh, 1.
1930. O'DONNELL, HENRY, F.P.C., M.S.P. (no address).
1927. O'MALLEY, Mrs OWEN St C., 1 More's Garden, Cheyne Walk, Chelsea, London, S.W. 3.

- 1922.*OCHTERLONY, CHARLES FRANCIS, Overburn, Lanark Road, Currie, Midlothian.
1924. OGILVIE, JAMES D., Barloch, Milngavie.
- 1907.*OKE, ALFRED WILLIAM, B.A., F.L.S., 32 Denmark Villas, Hove, Sussex.
1928. OLIPHANT, Rev. JOHNSTON, B.D., The Manse, Abertorn, South Queensferry.
1926. OLIVER, Mrs F. S., Edgerston, near Jedburgh.
1925. OSBORNE, Rev. THOMAS, Minister of Cockenzie Parish Church, Cockenzie Manse, Prestonpans.
1922. PATTERSON, GEORGE DUNCAN, 3 P. J. G. Avenue, Dundee.
1927. PATTERSON, Miss HILDA MAUD LESLIE, Birkwood, Banchoory, Kincardineshire.
1930. PATTERSON, JAMES GRAHAM, Wellwood, Irvine, Ayrshire.
1924. PATERSON, The Very Rev. JOHN N. M., The Manse, King William's Town, C.P., South Africa.
1915. PATERSON, JOHN WILSON, C.V.O., M.B.E., A.R.I.B.A., Principal Architect, Ministry of Works, 11 Abinger Gardens, Murrayfield, Edinburgh, 12.
1925. PATIENCE, ALEXANDER, "Pillar," 2 Carrick Drive, N. Mt Vernon, near Glasgow.
1931. PATON, EDWARD RICHMOND, of Hareshawmair, B.A.(Cantab.), F.Z.S., M.B.O.F., The Lodge, *en* Kilmaunock, Ayrshire.
1936. PATON, HENRY MACLEOD, Curator of Historical Records, H.M. Register House, 5 Little Road, Liberton, Edinburgh, 9.
1924. PATON, JAMES, 80 High Street, Lanark.
1933. PATRICK, WILLIAM MACFARLANE, Architect, 1, R.I.A.S., 35 Lintrathen Gardens, Dundee.
1925. PATTERSON, RICHARD FERRAR, M.A.(Cantab.), D.Litt.(Glas.), Orchard's Dyke, Bearsden, Dunbartonshire.
1928. PAUL, Lieut.-Colonel J. W., BAYLOR, D.S.O., D.L., *Marchmont Herald*, Cakemuir, Tynehead, Midlothian.
1923. PEARSON, Rev. Professor A. F. SCOTT, M.A., B.D., D.Th., D.Litt., F.R.Hist.S., The Manse, Johnstone, Renfrewshire.
1940. PERDUE, Major FRANK S., 45 Third Avenue, c/o P.O. Box 822, Newton Park, Port Elizabeth, South Africa.
1930. PETERS, ARTHUR BOWDEN, F.R.Met.S., Librarian and Curator, Inverness Public Library.
1912. PEYRELLI, Rev. LEONARD W., F.R.S.A., Hampeston Rectory, Wimborne, Dorset.
1938. PIGOTT, STUART, 1007 Linn, Roslindownie, near Fordingbridge, Hants.
1926. PILKINGTON, ALAN D., Achardaslad, Thurso, Caithness.
1939. PINE, LESLIE GILBERT, B.A.(Lond.), 20 Arundel Mansions, Fulham Road, London, S.W. 6.
1939. PITT-KETHLEY, HORACE VICTOR, "Wayside," Amersham, Bucks.
1939. PORTER, ERIC BRIAN, 5 Riley Avenue, St Anneseon-Sea.
- 1901.*PORTLAND, His Grace The DUKE OF, K.G., Welbeck Abbey, Notts.
1937. POUTER, GEORGE COLLINGWOOD BROWNLOW, Collingwood Place, Camberley, Surrey.
1927. PRENTICE, JAMES, c/o Mrs Osborne, 1 Lordswood Close, Bassett, Southampton.
- 1911.*PRESTON, FRANK A. B., F.L.S.E., F.R.San.L., F.R.S.E., MI Street L., L.R.I.B.A., M.T.P.I., Craigrownie, Bilarwell Road, Milngavie.
1903. PRINGLE, ROBERT M., Spettiswoode, Barnton Park, Davidson's Mains, Edinburgh, 4.
1924. PULLAR, PETER MACDOUGALL, 30 Harelaw Avenue, Muirhead, Glasgow, S. 4.
1926. PURDIE, THOMAS, Aucheneck, Kilmarn Stirlingshire.
1924. PURVES, JOHN M., M.C., 1 West Kelugas Road, Edinburgh, 9.
1928. QUIG, Rev. GORDON, M.A., B.D., 238 Colinton Road, Edinburgh, 11.
1932. QUIG, JAMES SYMINGTON, Ravenseraig, Falkirk.
1921. RAY, JOHN N., S.S.C., 2 Dunbe Street, Edinburgh, 4.
1932. RAMSAY, DAVID GEORGE, M.A., B.Sc., Rector of Kirlindbright Academy, Skar Kilmale, Kirkcubright.
- 1921.*RAMSAY, DOUGLAS M., J.P., Bowland, Galashiels, Selkirkshire.
1928. RANDALL-MACIVER, DAVID, M.A., D.Sc., c/o Messrs Brown Shipley & Co., 123 Pall Mall, London, S.W. 1.
- 1908.*RANKIN, WILLIAM BLACK, of Cheddars, 2 Rothesay Terrace, Edinburgh, 3.
1935. RANKINE, WILLIAM FRANCIS, Badshot Lea, Letcham, Surrey.
1927. RATCHFILL, JOSEPH RILEY, M.B., C.M. (Edin.), F.R.S.I., 22 Wake Green Road, Moseley, Birmingham.
1909. REID, ALPHONSO STODART, J.P., Bank of England Manchester, 2.
1931. RICHMOND, JOHN, c/o Mrs Ellis, 9 Forthall Terrace, Jedburgh.

1926. REOCH, JOHN. Hawthornden, Erskine Road, Whitecraggs Gilmock, Renfrewshire.
1935. RICE, D. TALBOT, O.B.E., M.A., D.Litt (Oxon.), B.Sc., Professor of Fine Art, Edinburgh University, 33 Moray Place, Edinburgh 3.
- 1928 *RICHARDSON, FRANCIS, Blairfornkie, Bridge of Alton.
- 1912.*RICHARDSON, JAMES S., Inspector of Ancient Monuments, Ministry of Works, 122 George Street, Edinburgh, 2.—*Creator of Museum*.
1923. RICHARDSON, JOHN, W.S., 28 Rutland Square, Edinburgh, 1.
1935. RICHMOND, IAN A., M.A., F.S.A., Lecturer in Roman-British Archaeology, University of Durham, King's College, Newcastle-upon-Tyne, 2.—*Creator of Museum*.
1919. RICHMOND, O. L., M.A., Professor of Humanity, University of Edinburgh, 5 Bedford Place, Edinburgh, 1.
1925. RITCHIE, Professor JAMES, M.A., D.Sc., F.R.S.E., Natural History Department, The University, Edinburgh, 31 Mortonhall Road, Edinburgh, 9.
1922. RITCHIE, WILLIAM MUIR, 11 Walkinshaw Street, Johnstone, Renfrewshire.
1907. ROBB, JAMES, LL.B., LL.D., 26 Ormidale Terrace, Edinburgh, 12.
1933. ROBB, JAMES A. T., High Mount, King's Road, Old Colwyn, N. Wales.
1933. ROBERTS, FERGUS, Town Clerk, Kirkcaldy, Kirktonhill, Dumbarton.
1940. ROBERTS, Rev. MATTHEW JOHN, M.A., A.K.C., Chaplain, Royal Air Force, c/o The Air Ministry, London.
1926. ROBERTSON, ALEXANDER D., M.A., 30 Stevenson Park, Carlisle, Lancashire.
1911. ROBERTSON, Miss ANNE S., M.A., 11 Harlow Avenue, Monmouth, Glasgow, 8, 1.
1927. ROBERTSON, Rev. ARCHIBALD F., M.A., B.D., 17 Cluny Gardens, Edinburgh, 10.
1937. ROBERTSON, DAVID, LL.B., S.S.C., Town Clerk, Edinburgh, 10 Strathcona Place, Edinburgh, 9.
1937. ROBERTSON, F. W., M.A., Ph.D., Librarian, 6 Gladstone Place, Wick, Caithness.
1938. ROBERTSON, FRANCIS JOHN, J.P., 11 Hailes Terrace, Edinburgh, 11.
1926. ROBERTSON, GEORGE S., M.A., The Cottage, Viewfield Road, Arbroath.
1930. ROBERTSON, JAMES MURKINJOHN, Architect, F.R.I.A.S., "Hamelin," 52 Craiglockhart Road, Edinburgh, 11.
1910. ROBERTSON, JOHN, J.P., 21 Laumerton Terrace, Dundee.
1935. ROBERTSON, RONALD MACDONALD, W.S., 20 Alva Street, Edinburgh, 2.
1928. ROBERTSON, THOMAS ATHOLL, Inveratholl, Alderman's Hill, Palmer's Green, London, N. 13.
1905. ROBERTSON, W. G. AITCHISON, M.D., D.Sc., F.R.C.P.E., St Margaret's, St Valerie Road, Bournemouth.
1925. ROBERTSON, WALTER MUIR, M.B., Ch.B., Trynlaw, Helensburgh.
1939. ROBERTSON-COLLIE, ALEXANDER, 357 Holburn Street, Aberdeen.
1939. ROBINSON, Rev. W. EASON, M.A., I.Th., 4 Pentland Villas, Juniper Green, Edinburgh.
1914. ROBISON, JOSEPH, 14 Castle Street, Kirkcaldy.
1925. ROGER, GEORGE GUTHRIE, M.A., B.Sc., 3 Myrtle Terrace, East Newport, Fife.
1939. ROGER, J. GRANT, B.Sc., 370 Great Western Road, Aberdeen.
1928. ROGLERSON, Rev. CHARLES, M.A., Villa Roma, Sandown Road, Shanklin, Isle of Wight.
1923. ROLLAND, Miss HELEN M., 6 Murrayfield Drive, Edinburgh, 12.
- 1930.*ROOT, Mrs FRIDERICK J., M.A., 6 Elsworth Court, Elsworth Road, London, N.W. 3.
1934. ROSENBOOM, ISAAC, 20 Shandwick Place, Edinburgh, 2.
1929. ROSS, JAMES, 10 Melmar Gardens, Edinburgh, 10.
1922. ROSS, Major JOHN, Emea, Langbank.
1926. ROSS, Dr WINIFRED M., Auchendean, Duham Bridge, Inverness-shire.
1927. ROWATT, THOMAS, O.B.E., M.M., M.I.Mech.E., Director, Royal Scottish Museum, Spottiswoode, Colinton.
1915. RUSK, J. M., O.B.E., J.P., S.S.C., Clinton House, Whitehouse Loan, Edinburgh, 10.
1936. RUSSELL, ARTHUR W., M.A., W.S., 25 Hope Terrace, Edinburgh, 10.
- 1930.*RUSSELL, DAVID, LL.D., Rothes, Markinch, Fife.
1914. RUSSELL, JOHN, 2 Banton Place, Edinburgh, 7.
1938. RUSSELL, RAYMOND, 27 Friary Street, Cambridge.
1923. St VIGRAN, The Hon. Lord, LL.D., 15 Grosvenor Crescent, Edinburgh 12.
- 1925.*SALVEND, IVER R. S., 6 Rothesay Terrace, Edinburgh, 3.
1930. SANDERSON, KENNETH, W.S., 5 Northumberland Street, Edinburgh, 3.
1930. SCARTH, HENRY W., Skail, Sandwick, Stromness, Orkney.
1936. SCHOLES, W., M.A., The Abbey, Fort Augustus.

- 1910.*SCOBIE, Major IAIN H. MACKAY, 1st Seaforth Highlanders, The Museum, Edinburgh Castle.
1926. SCOTT, Lieut.-Colonel D. HAY, M.B., Ch.B., 25 Wychwood Close, Bognor Regis, Sussex.
1935. SCOTT, Rev. JAMES G. DAWSON, M.A., F.S.A., Manse of Logiealmond, Perthshire.
1940. SCOTT, Rev. J. E., B.A., 41 Coldwell Park Drive, Felling-on-Tyne.
1938. SCOTT, Miss JUDITH D. GUILLUM, Honorary Secretary of the Southern Provincial Committee of the Central Council for Care of Churches, 94A Cromwell Road, South Kensington, London, S.W. 7 (during war at Earlsam, Dunster, Somerset).
1935. SCOTT, LAURENCE GRAY, Vingolf, Lerwick, Shetland.
1936. SCOTT, W. DAWSON, County Road Surveyor, Kirkwall, Orkney.
- 1931.*SCOTT, Sir WARWICK LINDSAY, K.B.E., D.S.C., B.A., Oxford and Cambridge Club, Pall Mall, London, S.W. 1.
1915. SCRYMGEOUR, NORVAL, Fellow of the Institute of Journalists, Summerfield, Longforgan, by Dundee.
1937. SEMPLE, WALTER, M.A., LL.B., Neidpath, Whitecraigs, Renfrewshire.
- 1927.*SHARP, ANDREW M., 8 South Inverleith Avenue, Edinburgh, 4.
1917. SHAW, JULIUS ADOLPHUS, Mus.D. Trin. Coll. Dublin, L.Mus., T.C.L., "Rosevine," Trevone, Padstow, N. Cornwall.
1918. SHAW, MACKENZIE S., W.S., 1 Thistle Court, Edinburgh, 2.
- 1930.*SHAW, R. CUNLIFF, M.Sc., F.R.C.S.Eng., L.R.C.P. (London), 24 Ribblesdale Place, Preston, Lancashire.
1917. SHAW, WILLIAM B., F.R.Hist.Soc., Honorary Curator of the Collections of the Presbyterian Historical Society of England, London, 36 Sandy Lane, Streteford, Manchester.
1937. SILVER, A. S., M.B., Ch.B. (Edin.), B.A. (Oxon.), The Old Parsonage, Davidson's Mains, Edinburgh, 1.
1940. SIM, STEWART, Architect, 57 Newington Road, Edinburgh, 9.
1926. SIMPSON, RICHARD J., Hermitage, Corstorphine, Edinburgh, 12.
1919. SIMPSON, WILLIAM DOUGLAS, M.A., D.Litt., Librarian, Aberdeen University, The Chaplains' Court, Chanoury, Old Aberdeen.—*Librarian*.
1908. SINCLAIR, COLIN, M.A., Ph.D., F.R.I.B.A., St Margaret's, 50 Ralston Avenue, Crookston, Glasgow, S.W. 2.
1909. SKINNER, ROBERT TAYLOR, M.A., F.R.S.E., 35 Campbell Road, Edinburgh, 12.
1939. SLEIGH, DANIEL JAMES, Ancient Monuments Department, Ministry of Works, Little Crawford, Kevoek Road, Lasswade.
1929. SIMON, ALEXANDER M., Moyhall, Kirkintilloch.
1922. SMYLL, THOMAS YOUNG, Solicitor, Castlewood, Jedburgh.
1933. SMITH, ALEXANDER, M.A., F.R.S.A., 1 Nixon Street, Newcastle-upon-Tyne, 2.
1930. SMITH, Miss ANNETTE, Addistoun, Ratho, Newbridge, Midlothian.
1931. SMITH, Rev. COLIN, M.A., Free Church Manse, Campbelltown.
1910. SMITH, DAVID BAIRD, C.B.L., LL.D., 5 Kirklee Terrace, Glasgow, W. 2.
1934. SMITH, JOHN, B.Sc., Chief Conservator of Forests, Sudan Government, Birkhall, Coalburn, Lanarkshire.
1936. SMITH, JOHN FREDERICK (Chief Librarian, Liverpool Public Libraries), Tutnal, Gwydrin Road, Calderstones, Liverpool, 18.
1938. SMITH, W. S. KENNEDY, D.A., Ayr Academy, Ayr.
1921. SOUTAR, CHARLES GEDDES, F.R.I.B.A., 15 South Tay Street, Dundee.
1935. SOUTER, GEORGE, Drynie, Dingwall.
1928. SPACKMAN, CYRIL SANDERS, R.B.A., L.R.I.B.A., R.M.S., F.R.S.A., F.R.S.A.I., The Studio, Ldridge Road, Croydon, Surrey.
- 1910.*SPENCER, Colonel CHARLES LOUIS, C.B.E., D.S.O., Warranbae, by Annan, Dumfriesshire.
1939. SQUAIR, Miss OLIVE M., 16 Kingsley Road, Wimbeldon London, S.W. 19.
1938. SULLIV, KENNETH A., M.A., Ph.D., Scottish Home Department, Dover House, Whitehall, London, S.W. 1.
1920. STEPHEN, Rev. WILLIAM, B.D., D.D., Carn Dearg, 68 Gardiner Road, Edinburgh, 4.
1930. STEVENS, C. E., M.A., Fellow of Magdalen College, Oxford.
1933. STEVENSON, Lt.-Colonel EDWARD DAYMOND, M.C., C.V.O., Secretary and Treasurer, The National Trust for Scotland, 4 Great Stuart Street, Edinburgh, 3.
1927. STEVENSON, Major HERBERT H. M'D., Culter House, Culter, Biggar, Lanarkshire.
1913. STEVENSON, PIERCE R., 7A Young Street, Edinburgh, 2.
1939. STEVENSON, ROBERT B. K., M.A., 31 Mansionhouse Road, Edinburgh, 9.—*Keeper of the Museum*.
1937. STEVENSON, WILLIAM B., D.D., LL.D., D.Litt., Emeritus Professor, 31 Mansionhouse Road, Edinburgh, 9.
1922. STEWART, ANDREW, H.M. Inspector of Taxes, 2 Card Drive, Partick, Glasgow, W. 1.
1922. STEWART, CHARLES, C.A., Bracken Bruach, Downfield, Dundee.

1925. *STEWART, IAN R. H., 11 Farquhar Road, Wimbledon Park London, S.W. 19.
1917. *STEWART, JOHN ALEXANDER, of Inchmahome, Bonaly, Clydes, Hibernia.
1939. STEWART, Major JOHN PHILIP, M.D., F.R.C.S.Ed., R.A.M.C., 18 Chester Street, Edinburgh, 3.
1929. STEWART, Mrs. JOHN A. Tempair, Duffin Terrace, Kinnoull, Perth.
1942. STEWART, Miss KATH F., B.A. Aldhune Lanark Road, Balerno.
1941. STEWART, ROBERT PRINGLE 16 Woodburn Avenue, Audrie.
1925. STIRLING, Colonel ARCHIBALD, of Garden, Sandyholes, Kippen, Stirlingshire.
1908. STIRTON, Rev. JOHN C.V.O., M.A., D.D., Delyme, Dreghorn Loan, Colinton.
1925. STORIE, WILLIAM STEVENSON, L.A., S.S.C., N.P., 9 Merchiston Crescent, Edinburgh, 10.
1930. *STRATHCONA AND MOUNT ROYAL, The Right Hon. LORD, 14 South Audley Street, London, W. 1.
1942. STRONACH, GEORGE W., 10 St Ninian's Road, Corstorphine, Edinburgh, 12.
1929. STRUTHERS, Major JAMES G., D.S.C., Ardmaddy Castle, by Oban.
1939. *STUART Lord DAVID, Woodland, Rothesay, But.
1939. STURROCK, EDWIN D. 2 Mohson Street Dundee.
1933. STURROCK, J. FREDERICK, 417 Blackness Road, Dundee.
1938. SUTHERLAND, FRANCIS G., W.S., 2 Arboretum Road, Edinburgh, 4.
1937. SUTHPRIAND, HAROLD HACO Solicitor, Aikerness, Wellpark Avenue, Kilmarnock, Ayrshire.
1923. SUTTELL, ARNOLD, L.R.I.B.A. M.Inst.M. & C.Y.E., M.R.S.S., Halifax Chambers, Oxford Street, Harrogate, Yorkshire.
1916. SWAN, T. AIKMAN A R.I.B.A., 7 St Colme Street, Edinburgh, 3.
1916. *TAIT, EDWYN SFYMOUR REID, Bydin, St Olaf Street, Lerwick, Shetland.
1933. TAIT, JAMES, 31 E. Congress Street, Detroit, Mich., U.S.A.
1929. TAYLOR, ALEXANDER B., M.A., D.Litt., "Glen-garry," Old Mearns Road, Newton Mearns, Glasgow.
1927. TAYLOR, CHARLES, 51 Keri Street, Kirkmildoch.
1917. TAYLOR, FRANK J., 118 Westgate Road, New-castle-on-Tyne.
1930. TAYLOR, JOHN, Collegehill House, Roslin, Midlothian.
1938. TEGGIN, JAMES RONALD, M.A., 78 Framingham Road, Brooklands, Cheshire.
1939. TIERRELI, HENRY, 13 Queenshaugh Drive, Stirling.
1911. TERRY-LOYD, JOHN, 18 Berkeley Court, Summerstrand, Port Elizabeth, South Africa.
1923. *THOMPSON, Professor HAROLD WILLIAM, A.M., Ph.D., New York State College, Albany, New York State, U.S.A.
1906. *THOMSON, DAVID COPPER, J.P., D.L., Inveravon, Broughty Ferry.
1929. THOMSON, GEORGE CLARK, Barrister-at-Law, P.O. Box 580, Swift Current, Saskatchewan, Canada.
1912. THOMSON, JAMES The Cedars 21 Fortis Green, East Finchley London, N. 2.
1939. THOMSON, JAMES CORNWALLIS, C.A., 13 Loudon Terrace, Glasgow, W. 2.
1913. THOMSON, JOHN GORDON S.S.C., 54 Castle Street, Edinburgh, 2.
1927. THOMSON, J. F. GORDON, M.A., Advocate, 26 Heriot Row, Edinburgh, 3.
1931. THOMSON, J. MILLER, W.S., 5 St Colme Street, Edinburgh, 3.
1926. THOMSON, LESLIE GRAHAME, A.R.S.A., A.R.I.B.A., F.R.I.A.S., "Strongara," West Linton, Peeblesshire.
1927. THOMSON, Mrs. Callan Is, West Linton, Peeblesshire.
1937. THOMSON, ROBERT B.Sc., Ph.D., A.M.I.Mech E., R.A.T.V.R., F.R.S.E., "Moonfield," Butler's Cross, Aylesbury, Bucks.
1936. THOMSON, THOMAS LAUDER, M.D., D.P.H., County Medical Officer, Dunbartonshire, Luskdale, Dumbarton.
1911. THORNTON, Lt-Col WILLIAM O.B.E., Woodville, St John's Road, Annan, Dumfriesshire.
1930. THORNEYCROFT, WALLACE, of Dalruizion, Chalmington, Dorchester.
1932. THRIPLAND, PATRICK WYNDHAM MURRAY, Dryburgh Abbey, St Boswells.
1933. *THYNE, JAMES COWAN, St Helens, Downfield, Dundee.
1930. TOD THOMAS M., West Brackly, Kinross.
1921. TOD, WILLIAM A., Shore Street, Bowmore, Isle of Islay.
1935. TOLLAND, Rev. JAMES, The Manse, 3 Belmont Church Road, Belfast.
1911. TOMLINSON, HAROLD ELLIS, M.A. (Hons.), F.I.C., 119 Fleetwood Road, Thornton-le-Fylde, Blackpool.
1936. TOWILL, Rev. EDWIN S., M.A., B.D., 32 Blacket Place, Edinburgh, 9.
1902. TRAILL, H. LIONEL NORTON, F.R.G.S., Capt., 11th Highland Light Infantry, c/o Captain M. P. Traill-Smith, R.N., "Wamsford," Herschel Road, Clarendon, Cape Town, South Africa.

1917. TRAILL, WILLIAM, C.E., J.P., Holland, Papa Westray, Orkney.
1932. TRANTER, NIGEL G., The Cross Cottage, Aberlady.
1939. TRENCH, G. MACKENZIE, O.B.E., F.R.I.B.A., F.S.I., Glen Morven, Forest Drive, Kingswood, Surrey.
- 1922.*TROTTER, GEORGE CLARK, M.D., Ch.B. (Edin.), D.P.H. (Aberl.), F.R.S.E., Braemar, 17 Haslemere Road, Crouch End, London N. 8.
1924. TULLIS, Major JAMES KENNEDY, Baingie Brae, Tullibody, by Stirling.
1925. TULLOCH, JAMES, M.A., 5 Wilton Gardens, Glasgow, N.W.
1934. TULLOCH, ROBERT G., M.A., 10 East Camus Road, Fairmilehead, Edinburgh, 10.
1936. TUNSTILL, W. H., Monkholme, Corbiehill Road, Davidson's Mains, Edinburgh, 4.
1922. TURNBULL, JOHN W., Kilbride, Millhouse, Tighnabruaich, Argyll.
1925. TURNER, FRED. A., F.R.Hist.S., Lasswade Cottage, 15 Penwerris Avenue, Osterley, Middlesex.
1937. TYZACK, FRANCIS JAMES, A.R.P.S., F.R.S.A., Laurel Cottages, Sheffield.
- 1917.*URQUHART, ALASTAIR, D.S.O., Latimer Cottage, Latimer, near Chesham, Bucks.
1930. VAIF, THOMAS H., A.C.A., Pakington House, 154 Rosemary Hill Road, Little Aston, Staffs.
- 1935.*VALENTINE, WILLIAM HARRIS, The Mansion House, Auchterhouse, by Dundee.
1936. VAN GIFFEN, Professor A. E., Biologisch Archaeologisch Instituut, Rijks Universiteit, Portstr. 6, Groningen, Holland.
- 1920.*VARMA, Prof. S. P., M.A., of Robertson College (no address).
- 1933.*VEITCH, GEORGE, C.A., 14 Chalmers Crescent, Edinburgh, 9.
1928. WALKER, ALEXANDER, 121 Great Western Road, Aberdeen.
1928. WALKER, Rev. GEORGE A. EVERETT, Minister of Parish of Benholm, Manse of Benholm, Johnshaven, Montrose.
1937. WALKER, NINIAN, Solicitor, Commercial Bank Buildings, Dunfermline.
1936. WALLACE, DAVID SWAN, W.S., 6 Eton Terrace, Edinburgh, 4.
1928. WALLACE, JAMES, M.A., Rector of Vale of Leven Academy, "Glenleven," Alexandria, Dunbartonshire.
1936. WALLACE, Rev. WILLIAM ANGUS, The Manse of Guthrie, by Forfar.
- 1927.*WALLIS, W. CYRIL, Assistant Keeper, Art and Ethnographical Department, Royal Scottish Museum, 53 Spottiswoode Street, Edinburgh, 10.
1919. WARR, The Very Rev. CHARLES LAING, C.V.O., M.A., D.D., Minister in St Giles Cathedral, Dean of the Most Ancient and Most Noble Order of the Thistle, and Dean of the Chapel Royal in Scotland, 63 Northumberland Street, Edinburgh, 3.
1923. WARRACK, MALCOLM, 7 Oxford Terrace, Edinburgh, 1.
1932. WASON, C. R., 1 Woodland Terrace, Glasgow, C. 3.
1916. WATERSON, DAVID, R.E., Bridgend House, Brechin.
1924. WATERSTON, CHARLES B., 25 Howard Place, Edinburgh, 4.
1904. WATLING, H. STEWARD, Architect, Plas Conwy, Gogarth, Llandudno, N. Wales.
- 1907.*WATSON, CHARLES B. BOOG, F.R.S.E., 24 Garscube Terrace, Murrayfield, Edinburgh, 12.
1921. WATSON, GEORGE MACKIE, F.R.I.B.A., 17 East Claremont Street, Edinburgh, 7.
1913. WATSON, G. P. H., F.R.I.B.A., Royal Commission on Ancient and Historical Monuments of Scotland, 27 York Place, Edinburgh, 1.
1922. WATSON, HENRY MICHAEL DENNY, C.A., 12 Henderland Road, Murrayfield, Edinburgh, 12.
- 1927.*WATSON, JOHN HILL, of Grangehill, Beith, Ayrshire.
- 1908.*WATSON, JOHN PARKER, W.S., Greystane, Kinellan Road, Murrayfield, Edinburgh, 12.
1930. WATSON, THOMAS WILLIAM, J.P., The Schoolhouse, Gullane.
- 1927.*WATSON, WILLIAM ELDER, O.B.E., J.P., Moray Bank, Elgin.
1912. WATSON, WILLIAM J., M.A., LL.D., D Litt.Celt., F.R.S.E., Emeritus Professor of Celtic Languages, Literature and Antiquities, University of Edinburgh, 17 Merchiston Avenue, Edinburgh, 10.
1933. WATT, Rev. DOUGLAS W., M.A., 20 Bannock Road, Glasgow, W. 1.

- 1907.*WATT, JAMES, LL.D., W.S., F.F.A., 7 Blackford Road, Edinburgh, 9.
- 1908 WATT, The Very Rev. LAUCHLAN MACLEAN, M.A., D.D., LL.D., Kinloch, Lochcarton, Ross-shire.
- 1923.*WATT, WILLIAM J. C., M.B., Ch.B., 71 High Street, Paisley.
1937. WEDDERBURN, SIR ERNEST MACLAGAN, M.A., LL.B., D.Sc., LL.D., Deputy Keeper of His Majesty's Signet, 6 Succoth Gardens, Edinburgh, 12.
- 1928.*WEIR, Rev. HAROLD GEORGE MULLO, M.A., The Manse, Dalry, Kirkeudbrightshire.
1925. WEIR, JAMES MULLO, S.S.C., 21 Mayfield Terrace, Edinburgh, 9.
1939. WEIR, JOHN L., M.A., 153 West Regent Street, Glasgow, C. 2.
1927. WEIR, WALTER, 18 Cathkin Road, Langside, Glasgow, S. 2.
1926. WESTELL, W. PERCIVAL, F.L.S., F.R.S.A., Letchworth Public Museum, Town Square, Letchworth, Herts.
1932. WESTON, PERCY WILLIAM, F.R.G.S., F.C.S., F.Z.S., F.R.H.S., F.R.E.S., Villa Chappott, Tangier, Morocco.
1937. WESTWATER, ALEXANDER, Publisher, Station Road, Lochgelly, Fife.
1939. WHITE, JOHN, 18A Arthur Street, Edinburgh, 6.
1925. WHITE, WILLIAM, 28 Shore Road, Anstruther, Fife.
1909. WHITTAKER, CHARLES RICHARD, F.R.C.S., F.R.S.E., Lynwood, 27 Hatton Place, Edinburgh, 9.
1937. WIGHTMAN, A. STUART, F.R.A.I., F.Z.S., 15 Macdowall Road, Edinburgh, 9.
1897. WILLIAMS, H. MALLAM, J.P., Tilehurst, 34 Southern Road, West Southbourne, Bournemouth, Hants.
1930. WILSON, ARTHUR, J.P., 6 Saltoun Gardens, Glasgow, W. 2.
1935. WILSON, ARTHUR W., "Rannerdale," Venturefair Avenue, Dunfermline.
1933. WILSON, DAVID, A.R.I.A.S., 15 Prospect Bank Place, Leith, Edinburgh, 6.
1933. WILSON, JAMES PEARSON, Millbank, Privick Mill, Ayr.
1934. WILSON, Major MAURICE J. H., The Queen's Own Cameron Highlanders, Ashmore, Bridge of Cally, Perthshire.
1932. WILSON, P. DOUGLAS, M.Inst.C.E., 78 Comiston Drive, Edinburgh, 10.
- 1927.*WILSON, ROBERT, 139 Princes Street, Edinburgh, 2.
- 1923.*WILSON, Rev. S. GORDON F., M.A., B.Litt., A.K.C., F.R.Hist.S., Blean Vicarage, near Canterbury, Kent.
1913. WILSON, Rev. THOMAS, M.A., D.D., Flat 5, Meyrick Park Mansions, Bodorgan Road, Bournemouth.
1920. WISHART, DAVID, Pittarrow, Abernethy, Perthshire.
- 1934.*WISHART, FREDERICK, 632 King Street, Aberdeen.
1929. WOLFENDEN, WILLIAM, J.P., Cluny Villa, Kingussie, Inverness-shire.
1930. WRIGHT, ALEXANDER, L.R.I.B.A., 110 Blythswood Street, Glasgow, C. 2.
1938. WRIGHT, Rev. RONALD SELBY, M.A., The Manse of the Canongate, Edinburgh, 8.
1927. WRIGHT, Rev. WILLIAM, M.A., B.D., Minister of the Parish of Wardlawhill, 21 Chncarthill, Rutherglen.
1925. WYNESS, J. FENTON, A.R.I.B.A., A.I. Archts. Scot., 45 Salisbury Terrace, Aberdeen.
1938. YATES, Miss AGNES AIKEN, B.Sc., Greenvale, Ardbeg Road, Rothesay.
1937. YOUNG, Mrs H. NUGENT, 10 Onslow Court, Drayton Gardens, London, S.W. 10.
1933. YOUNG, ROBERT STORER, J.P., Hon. Sheriff-Substitute of Fife and Kinross, Duncroft, Kinross.
1931. YOUNG, T. P. W., A.R.I.B.A. (Flying Officer, R.A.F.) c/o Messrs Glyn Mills & Co. (Holts Branch), Kirkland House, Whitehall, London, S.W. 1.
1929. YOUNGER, Mrs J. P., Arnsbrae, Cambus, Clackmannanshire.
- 1939.*YULE, BRIAN JOHN GEORGE, 28 Queen's Crescent, Edinburgh, 9.

CORRESPONDING MEMBERS

1937. ANDERSON, R. W., Whitestone Knowe, Peebles.
 1923. BLACK, GEORGE E., Ph.D., 325 Watson Avenue
 Lyndhurst, New Jersey, U.S.A.
 1927. BREMNER, SIMON, Mid Town, Frieswick, Cathness.
 1928. FORTUNE, JOHN ROBERT, Alnhouse, Oxtou,
 Berwickshire.
 1915. MATHIESON, JOHN, F.R.S.E., 42 East Claremont
 Street, Edinburgh, 7.
 1936. MOAR, PETER, Commission Agent, 4 Thorfinn
 Street, Lerwick, Shetland.
 1915. MORRISON, MURDO, Lakefield, Bragar, Lewis.
 1931. SMITH, SAMUEL, Munnills, Laurieston, near
 Falkirk.
 1936. TAIT, DAVID, 14 Glendevon Place, Edinburgh, 12.
 1933. YORSTON, JAMES, Vervalle, Rousay, Orkney.

HONORARY FELLOWS

1908. Professor H. DRAGENDORFF, Freiburg i. Baden, Johan von Weirthstrasse 4.
 1923. M. L'ABBÉ H. BRÉCHU, D.L.C., Hon. Professor Dept. of Archaeology, University of the
 Witwatersrand, Johannesburg, South Africa.
 Professor FRANZ CUMONT, 19 Corso d'Italia, Rome.
 Sir G. F. HILL, K.C.B., M.A., LL.D., Litt.D., F.B.A., F.S.A., Knottocks, Knotty Green,
 Beaconsfield, Bucks.
 FRANK GERALD SIMPSON, M.A., 44 Brampton Road, Carlisle.
 Mrs ARTHUR STRONG, C.B.E., M.A., LL.D., Litt.D., F.S.A., Life-Fellow of Gtton College,
 Cambridge (no address).
 A. M. TALLGREN, Professor Universitetet, Helsingfors, Finland.
 1926. MARCELLIN BOULE, Professor in the Musée National d'Histoire Naturelle, and Director of
 the Institut de Paléontologie Humaine, 1 rue René Panhard, boulevard Saint-Marcel, Paris
 13^e.
 Professor Dr philos. A. W. BRYGGER, Bestyrer av Universitetets Oldsaksamling, Tullinlokken,
 Oslo, Norway.
 O. M. DALTON, M.A., F.B.A., Hollord, Somerset.
 Professor Dr ERNST FABRICIUS, Geheimer Rat, Goethestrasse 44, Freiburg im Breisgau,
 Germany.
 Sir ARTHUR KEITH, LL.D., M.D., D.Sc., F.R.C.S., F.R.S., Conservator of the Museum
 and Hunterian Professor, Royal College of Surgeons of England; Past-President of the Royal
 Anthropological Institute of Great Britain and Ireland, and of the Anatomical Society.
 Master of the Buckton Browne Farm, Downe, Farnborough, Kent.
 Dr R. PARIBENI, Director of the Institute of Archæology of Rome, Museo Nazionale Romano,
 Rome.

1927. DON HERMILIO ALCALDE DEL RIO, Torrelavega, Santander, Spain.
1931. Mrs M. E. CUNNINGTON, 33 Long Street, Devizes, Wiltshire.
Professor Dr ROBERT ZAHN, Director bei den Staatlichen Museen, Honorar-professor an der Universität, Am Lustgarten, Berlin, C.2.
1933. Professor Dr philos. HAAKON SHETELIG, Bergens Museums Oldsamling, Bergen, Norway.
1935. Professor GERHARD BERTS, Zentralkdirektion des Archäologischen Instituts des Deutschen Reiches, Woynschstr. 30 c., Berlin, W. 35.
1939. Professor Dr ANDREAS ALFOLDI, Pázmány-Universität, Múzeum-Korut 6-8, Budapest, VIII.
O. G. S. CRAWFORD, H.M. Ordnance Survey, Southampton.

LADY ASSOCIATE

1900. Professor Emeritus M. A. MERRAY, University Museum of Archaeology and of Ethnology, Downing Street, Cambridge, 99 Blinco Grove, Cambridge.

SOCIETIES, INSTITUTIONS, &c., EXCHANGING PUBLICATIONS.

- | | |
|--|--|
| Architectural, Archæological, and Historic Society of Chester and North Wales. | Royal Archæological Institute of Great Britain and Ireland. |
| Belfast Natural History and Philosophical Society. | Royal Commission on Ancient and Historical Monuments of Scotland. |
| Berwickshire Naturalists' Club. | Royal Commission on the Ancient and Historical Monuments and Constructions in Wales and Monmouthshire. |
| Bristol and Gloucestershire Archæological Society. | Royal Historical Society. |
| Buchan Club. | Royal Institute of British Architects, London. |
| Buteshire Natural History Society. | Royal Irish Academy. |
| Cambrian Archæological Association. | Royal Numismatic Society. |
| Cambridge Antiquarian Society. | Royal Society of Antiquaries of Ireland. |
| Cardmarthenshire Antiquarian Society. | Scottish Ecclesiological Society. |
| Courtauld Institute of Art. | Shropshire Archæological Society. |
| Cumberland and Westmorland Antiquarian and Archæological Society. | Society for the Promotion of Roman Studies. |
| Derbyshire Archæological Society. | Society of Antiquaries of London. |
| Dumfriesshire Natural History and Antiquarian Society. | Society of Antiquaries of Newcastle-upon-Tyne. |
| Edinburgh Architectural Association. | Somersetshire Archæological and Natural History Society. |
| Edinburgh Geological Society. | Stirling Natural History and Archæological Society. |
| Elgin Literary and Scientific Society. | Surrey Archæological Society. |
| Essex Archæological Society. | Sussex Archæological Society. |
| Gaelic Society of Inverness. | Third Spalding Club. |
| Glasgow Archæological Society. | Viking Society for Northern Research. |
| Hampshire Field Club and Archæological Society. | Wiltshire Archæological Society. |
| Hawick Archæological Society. | Yorkshire Archæological Society. |
| Historic Society of Lancashire and Cheshire. | |
| Institute of Archæology, Liverpool. | |
| Kent Archæological Society. | |
| Orkney Antiquarian Society, Kirkwall. | |
| Perthshire Society of Natural Science. | |
| Powys-land Club. | |
| Royal Anthropological Institute. | Archæological Survey of India. |
| | British School at Rome. |

Colombo Museum, Ceylon.
 Royal Canadian Institute, Toronto.
 Royal Ontario Museum of Archaeology, Toronto, 5,
 Canada.
 University Museum, Dunedin, New Zealand.

FOREIGN SOCIETIES, UNIVERSITIES,
 MUSEUMS, &c.

Académie des Inscriptions et Belles Lettres, Paris.
 Académie des Sciences, Leningrad, U.S.S.R.
 Académie des Sciences d'Ukraine, Kieff.
 Académie Royale Serbe, Belgrade.
 Administration des Monuments, Riga, Latvia.
 Anthropologische Gesellschaft, Vienna, Ostmark,
 Germany.
 Antiquarische Gesellschaft, Zurich.
 Archaeological Institute of the Imperial University
 of Kyoto, Japan.
 Archæologisches Institut D. Kon. Ung. Franz
 Joseph-Universität, Szeged, Hungary.
 Archæologisches Institut der Pázmány Universität,
 Budapest.
 Archæologisches Institut des Deutschen Reiches
 Romisch-Germanische Kommission, Frankfurt
 am Main.
 Associació Catalana d'Antropologia, Etnologia i
 Prehistòria, Barcelona Universität, Spain.
 Bosnisch-Herzegovinisches Landes-Museum, Sara-
 jevo, Yugoslavia.
 Bureau of Ethnology, Washington.
 California University, Berkeley.
 Commissione Archeologica Comunale di Roma.
 Cornell University Library, Ithaca, New York.
 Čsl. státní archæologický ústav (Institut archéolo-
 gique de l'Etat tchécoslovaque) Praha, Re-
 publika československá, Czechoslovakia.
 Department of Antiquities in Palestine, Jerusalem.
 Deutsch-ausländischer Buchtausch, Berlin.
 Ecole d'Anthropologie de Paris.
 Faculté des Sciences de Lyon.
 Field Museum of Natural History, Chicago.
 Foreningen til Norske Fortidsmindesterkeres
 Bevaring.
 Göteborg och Bohuslans Fornminnesforeningen.
 Göttingen University.
 Historische und Antiquarische Gesellschaft, Basel.
 Historischer Verein für Niedersachsen.
 Institut Archéologique Bulgare, Sofia.
 Institut de Paléontologie Humaine, Paris.
 Istituto Italiano di Antropologia, Rome.
 Kiel University.
 Kongelige Norske Videnskabers Selskab, Trondhjem.
 Landesanstalt für Volkheitskunde, Halle a Saale,
 Saxony.
 Landesmuseum, Hannover.
 Landesmuseum Nassauischer Altertümer zu Wies-
 baden.
 Leipzig University.
 Musée Archéologique Erasie Majewski de la Société
 des Sciences de Varsovie, Poland.
 Musée d'Art et d'Histoire, Geneva, Switzerland.
 Musée Guimet, Paris.
 Musée National Suisse à Zurich.
 Museum, Bergen, Norway.
 Museum of Northern Antiquities, Oslo.
 National Bohemian Museum, Prague, Czecho-
 slovakia.
 National Museum, Zagreb, Yugoslavia.
 Nordiska Museet, Stockholm.
 Norsk Folkemuseum, Oslo, Norway.
 Oslo University, Norway.
 Peabody Museum, Cambridge, Mass., U.S.A.
 Prähistorische Kommission der Akademie der
 Wissenschaften in Wien, Ostmark, Germany.
 Prussia-Museum, Königsberg (P).
 Reale Accademia Nazionale dei Lincei, Rome.
 Rhein. Landesmuseum, Trier.
 Rijks-Museum van Oudheden, Leiden.
 Romisch-Germanischen Zentral Museum, Mainz,
 Germany.
 Royal Academy of History and Antiquities,
 Stockholm.
 Royal Society of Northern Antiquaries, Copenhagen.
 Schlesischer Altertumsverein, Breslau.
 Smithsonian Institution, Washington, U.S.A.
 Société d'Anthropologie de Paris.
 Société des Antiquaires de l'Ouest.
 Société Archéologique du Midi de la France.
 Société Archéologique de Montpellier.
 Société Archéologique de Moravie.
 Société Archéologique de Namur.
 Société des Bollandistes, Brussels.
 Société Finlandaise d'Archéologie, Helsingfors.
 Société d'Histoire et d'Archéologie de Gand.
 Société Nationale des Antiquaires de France.
 Société Préhistorique Française, Paris.
 Société Préhistorique Polonaise.
 Société Royale d'Archéologie, Bruxelles.
 Städtisches Museum für Volkerkunde, Leipzig.
 Stavanger Museum, Stavanger, Norway.
 Türk Tarih Kurumu, Ankara, Turkey.
 University Library, Lund, Sweden.
 University Library, Tartu, Esthonia.

Upsala University.

Verein für Nassauische Alterthums-kunde, Wiesbaden.

Verein von Alterthumsfreunden im Rheinlande, Bonn.

Wiener Præhistorische Gesellschaft, Ostmark, Germauy.

PERIODICALS.

Atlantis: Actas y Memorias de la Sociedad Española de Antropologia, Etnographia y Prehistoria y Museo Etnologico Nacional, Madrid.

L'Anthropologie, Paris.

Bulletin archéologique polonais, Warsaw.

LIBRARIES, BRITISH.

Athenæum Club Library, London.

Baillie's Institution, Glasgow.

Bodleian Library, Oxford.

British Museum Library.

Chetham's Library, Manchester.

Church of Scotland College Library, The Mound, Edinburgh.

Free Library, Edinburgh.

Free Library, Liverpool.

Mitchell Library, Glasgow.

National Library of Scotland, Edinburgh.

National Library of Wales, Aberystwyth.

Ordnance Survey Library, Southampton.

Public Record Office Library, London.

Royal Library, Windsor.

Royal Scottish Museum Library, Edinburgh.

Scottish National Portrait Gallery Library.

Scottish Record Office, Historical Department.

Signet Library, Edinburgh.

Trinity College Library, Dublin.

University Library, Aberdeen.

University Library, Cambridge.

University Library, Edinburgh.

University Library, Glasgow.

University Library, St Andrews.

Victoria and Albert Museum Library, London.

LIBRARIES, FOREIGN.

Bayerische Staatsbibliothek, Munich, Bavaria.

Bibliothèque d'Art et d'Archéologie, Université de Paris.

National Library, Paris.

National Library, Vienna.

Newberry Library, Chicago, U.S.A.

Preussische Staatsbibliothek, Berlin.

Public Library, Hamburg.

Royal Library, Copenhagen.

Royal Library, Stockholm.

Sächsische Landesbibliothek, Dresden.

SUBSCRIBING LIBRARIES, ETC.

American Philosophical Society.

Ashmolean Museum, Oxford.

Birmingham Public Libraries—Reference Library.

Carnegie United Kingdom Trust—The Scottish Central Library for Students, Dunfermline.

Chicago University Library, Chicago, U.S.A.

Cleveland Public Library, Ohio, U.S.A.

*Columbia University.

Department of British and Mediæval Antiquities, British Museum.

Detroit Public Library, Detroit, U.S.A.

Dr Hay Fleming Library, The University, St Andrews.

*Faculty of Procurators' Library, Glasgow.

Falkirk Archæological and Natural History Society.

Falkirk Public Library.

Free Public Library, Boston, Massachusetts, U.S.A.

Harvard College, U.S.A.

Henry E. Huntington Library and Art Gallery, San Marino, California, U.S.A.

Institute of Accountants and Actuaries in Glasgow.

Jesus College, Oxford.

John Rylands Library, Manchester.

Metropolitan Museum of Art, New York, U.S.A.

National Museum of Wales, Cardiff.

New York Public Library, New York.

Pennsylvania Historical Society, Philadelphia, U.S.A.

Princeton Theological Seminary, New Jersey, U.S.A.

Public Library, Aberdeen.

Public Library, Dundee.

Public Library of Victoria, Melbourne, Australia.

Public Library, Civic Center, San Francisco, California, U.S.A.

State Historical Society of Wisconsin, Madison, Wisconsin, U.S.A.

*Stornoway Public Library, Island of Lewis.

University College, Dublin.

University Library, Durham.

University Library, Leeds.

University of London, W.C. 1.

University of Manchester.

University of Michigan, Ann Arbor.

University of Minnesota, U.S.A.

University of Pennsylvania, Philadelphia, Pa., U.S.A.

Yale University Library, New Haven, Connecticut, U.S.A.

PROCEEDINGS

OF THE

SOCIETY OF ANTIQUARIES OF SCOTLAND

— — —

ONE HUNDRED AND SIXTY-SECOND SESSION, 1941-1942

ANNIVERSARY MEETING, 29th November 1941.

ALEXANDER O. CURLE, C.V.O., LL.D.,
Vice-President, in the Chair.

William Angus and James S. Richardson were appointed Scrutineers of the Ballot for Office-Bearers.

The Ballot having been concluded, the Scrutineers found and declared the List of the Council for the ensuing year to be as follows:—

President.

Sir JOHN STIRLING MAXWELL, Bart., K.T.

Vice-Presidents.

ALEXANDER O. CURLE, C.V.O., LL.D.
Rev. WILLIAM BURNETT, B.D.
Sheriff C. H. BROWN, K.C.

Councillors.

DAVID BAIRD SMITH, C.B.E., LL.D.	Emeritus Professor W. B. STEVENSON,
Professor D. TALBOT RICE, M.A., B.Sc.	D.Litt., D.D., LL.D.
IAN A. RICHMOND, M.A., F.S.A.	JOHN RICHARDSON, W.S.
REGINALD F. J. FAIRLIE, LL.D., R.S.A.,	W. A. MUNRO, D.Litt.
F.R.I.B.A.	IAN G. LINDSAY.
	W. MACKAY MACKENZIE, M.A., D.Litt.

Secretaries.

DOUGLAS P. MACLAGAN, W.S. | ANGUS GRAHAM, M.A.
VOL. LXXVI.

Professor V. GORDON CHILDE, D.Litt., D.Sc., F.B.A. Professor W. M. CALDER, M.A., LL.D., F.B.A.

J. BOLAM JOHNSON, C.A.

JAMES CURLE, LL.D. JAMES S. RICHARDSON.

ROBERT KERR, M.A.

W. DOUGLAS SIMPSON, M.A., D.Litt.

The Hon. Sir HEW H. DALRYMPLE, K.C.V.O., } *Representing the Board of*
KENNETH SANDERSON, W.S., } *Trustees.*

The Secretary read the following List of Members deceased since the last Annual Meeting:—

The Secretary read the following Report by the Council on the affairs of the Society for the year ending 30th November 1941:---

The Council herewith submit to the Fellows of the Society their Report for the year ending 30th November 1941.

<i>Fellowship</i> .—The total number of Fellows on the roll at	
30th November 1940 was	949
At 30th November 1941 the number was	919
being a decrease of	30

During the year the names of 11 new Fellows were added to the roll, while 23 died, 13 resigned, and 5 allowed their membership to lapse. Under present conditions it is inevitable that new applications for Fellowship should show a considerable falling off as compared with those of previous years, and that there should also be a number of resignations. To counteract this, the Council hope that Fellows will do what they can to lay before their friends the advantages of joining the Society.

Among the Fellows who have died in the course of the year, the Council desire to make particular reference to Mr Thomas Yule. In addition to his long period of service on the Council, Mr Yule was a most generous donor and was never appealed to in vain for the means necessary for the purchase of an object for the Museum or of a book for the Library.

Proceedings.—Volume LXXV. of the *Proceedings* is in the press, and no advance copy is available for inspection. It contains 11 papers dealing with prehistoric, mediæval, and post-mediæval subjects, together with a number of Notes, mostly concerned with reports on sporadic finds of prehistoric objects.

The Museum.—The number of relics added to the Museum during the year amounted to 101 by donation and 1 acquired through The King's and Lord Treasurer's Remembrancer.

Owing to the war the scientific excavation of archaeological sites, whether by the Society or by the Ministry of Public Works and Buildings, has practically ceased, and during the year sites have only been examined in cases where this was urgently necessary for the purpose of recording structural features and the preservation of any relics that might be found before the sites were destroyed. It is largely on this account, and also because the Museum still remains closed to the public, that the number of acquisitions has fallen off.

A number of important additions have, however, been made to the Bronze Age Collection. A food-vessel urn found in a cist at Skateraw, East Lothian, was presented by Mr D. L. Bowes; and several pieces of cinerary urns and flint implements, found on the estate of Balnamoon, Balrownie, Brechin, were presented by Lt.-Col. W. B. Carnegie-Arbutnot, F.S.A.Scot.

Relics from the excavation of a "Wag" near Forse, Caithness, and its associated dwelling, by Dr A. O. Curle, the first to be obtained from such a site, were presented by Captain W. Baird of Forse.

Among objects belonging to later periods, an early seventeenth-century slipped-in-the-stalk silver spoon, found at Kirkhope Tower, Selkirkshire, was presented by Mrs Macmillan, and a further donation of Communion Tokens has been made by Mr A. S. Kinloch Paul.

The Library.—The Library has remained open throughout the year and has been used for reference by Fellows and by members of the general public. Only 23 books have been acquired by donation, and 4 by purchase. The number obtained by exchange with societies has been much reduced, and fewer volumes than usual have been bound owing to the reduction of the grant for this purpose.

Rhind Lectureship.—The Rhind Lectures for 1941 were delivered by Dr W. Douglas Simpson, his subject being "The Province of Mar." It is hoped that Dr W. C. Dickinson, who was appointed Rhind Lecturer for 1940, will be able to deliver his course of lectures some time next year, the subject being "The Jurisdictions of Mediæval Scotland." Notification will be made to Fellows in due course.

The Gunning Fellowship.—No award was made for 1941.

The Chalmers-Jervise Prize.—This prize was not advertised, owing to circumstances created by the war.

(Signed) ALEX. O. CURLE,
Vice-President.

Dr James MacLehose moved the adoption of the Report and the motion was seconded by Dr W. Mackay Mackenzie.

The Accounts of the Society for the year 1939-40, which had been circulated amongst the Fellows, were unanimously approved.

Professor Stevenson moved the adoption of the Accounts and Mr John Richardson seconded the motion. A hearty vote of thanks was accorded to the Treasurer.

I.

A MURAL PAINTING AND A CARVED DOOR AT TRAQUAIR HOUSE, INNERLEITHEN. BY G. P. H. WATSON, F.R.I.B.A., F.S.A.Scot., AND A. GRAHAM, F.S.A.Scot., F.S.A.

Read January 31, 1942.

It is now generally recognised that mural painting was a form of art extensively practised in mediæval Britain. Broadly speaking, its use in churches, both as a medium for instruction and as a decoration, went out with the Reformation: but it continued to be employed in secular buildings until superseded by other types of wall-covering such as tapestry, panelling, and finally wall-paper. Despite all the destruction that has taken place, England still possesses nearly a thousand mediæval mural paintings. Very few, however, have been recorded in Scotland, although the art was evidently practised here at an early time—Barbour, for example, tells us that St Margaret caused a picture to be painted for her chapel in Edinburgh Castle,¹ while traces of such paintings can still be seen in the abbey churches of Dunfermline, Inchcolm, and Culross, Dunkeld Cathedral, Plusearden Priory, and elsewhere. In secular buildings the most important series of murals are those at Kinneil House, so admirably described by Mr J. S. Richardson, F.S.A.Scot., in the last volume of the *Proceedings*. In the present paper we draw attention to a contemporary mural at Traquair House, near Innerleithen, which is little known and has not hitherto been recorded in detail.

This painting is in a room on the second floor at the north-west end of the main block. This end is generally held to be the oldest part of the house, but it may prove on close examination to be an extension from an older tower on the south-east. Be that as it may, the part containing the mural can be assigned to the second half of the sixteenth century, and its superstructure was remodelled in the seventeenth century. The painting originally ran the full length of the south-east wall of this room, covering a width of 19 feet 9½ inches, but to-day the central portion has suffered so severely from damp and from atmospheric changes that the details of the design can only be made out at the ends (Pls. I and II). It obviously formed part of a series which continued round the other walls also. It starts 4 feet above the floor, either to leave room for a bancar, a bench with a high back, to stand below it, or more probably to allow of the lower edge of the painting being continued on the lintel of a fireplace which is situated at the south end of the wall. The top of the upper border is hidden by one of the joists supporting the floor above, with the result that the part exposed

¹ *The Bruce* (ed. S.T.S.), x, pp. 741–9.

measures 5 feet 2 inches in height. Of this, 3 feet 8 inches is occupied by an assemblage of vines, in which are depicted four birds, one of them obviously an eagle, as well as a hound with a collar, a squirrel, and a galloping Bactrian camel. The latter animal was not entirely unknown in mediæval Scotland, seeing that as early as 1105 one was presented by Edgar, King of Alban, to Murtough O'Brien: and in 1659 "ane heigh great beast, callit ane Drummodary" was exhibited in the Canongate of Edinburgh. The painted ceiling of 1620 at Earls Hall shows an animal very like the one at Traquair and the artist labels it a "Dromedarie." The assemblage is bordered at top and bottom by texts in Gothic lettering, the upper text (Acts i, 14, 15) reading: [THESE ALL] CONTINUED W(ITH) ON(E) ACCORD IN [PRAYER AND SU]PPPLICATION W(ITH) YE WOMEN AND MARY YE MOTHER OF JESUS AND W(ITH) HIS BRETHREN . AND [IN THOSE] DAYES [PETER STOOD UP IN THE MIDST OF THE DISCIPLES AND SAID, ETC.]. The one at the bottom (Acts i, 16-18) reads: [MEN AND BRETHREN THIS SCRIPTURE MUST NEEDS HAVE BEEN FULFILLED] WHICHE YE HOLY GHOST [BY] YE MOUTHE OF DAVID SPAKE BEFOIR OF JUDAS WHICHE WAS G[UIDE TO THEM THAT TOOK JESUS . FOR HE WAS NUMBERED WITH U[S A[N]D (HAD) O[BTAIN]ED PA[RT OF THIS] MINISTR[Y] . NOW THIS MAN PURCHASED A FIELD WITH THE REWARD OF INIQUITY, ETC.].

The painting is carried out in tempera on the plaster of the wall, the colours seen being black and red, but other colours of a fugitive nature may also have been employed. The brushwork is bold and confident, obviously the work of a practised hand. No evidence was seen either of pouncing or of the use of the stylus. As in the case of the earlier series at Kinneil, the details are outlined in solid colour, glazing being resorted to only on the hound, the squirrel, the camel, and the eagle.

The texts have been taken from the Geneva version which first appeared in 1557. The drawing of the hound is closely related to the illustration on p. 26 of Gesner's *Icones Animalium*, ed. 1560, which, it is interesting to note, is titled "*Ein Brack, ein schottischer Wasserhund*" (water-dog). In that illustration the dog faces left and has no collar, and one is tempted to suggest that the Traquair painter copied the collar from Gesner's illustration of an English bloodhound on the opposite page; some credit must be given, however, to his powers of invention. He certainly did not copy the camel from Gesner.

As for the background, it may represent Aeldama, the Field of Blood, but it is more likely to be a conventional assemblage. Mr Richardson has drawn our attention to a similar treatment of vines in the hall at Huntingtower, which he had tentatively dated to before 1540. At Traquair the texts afford a *terminus a quo* and the stylistic evidence puts the *terminus ad*



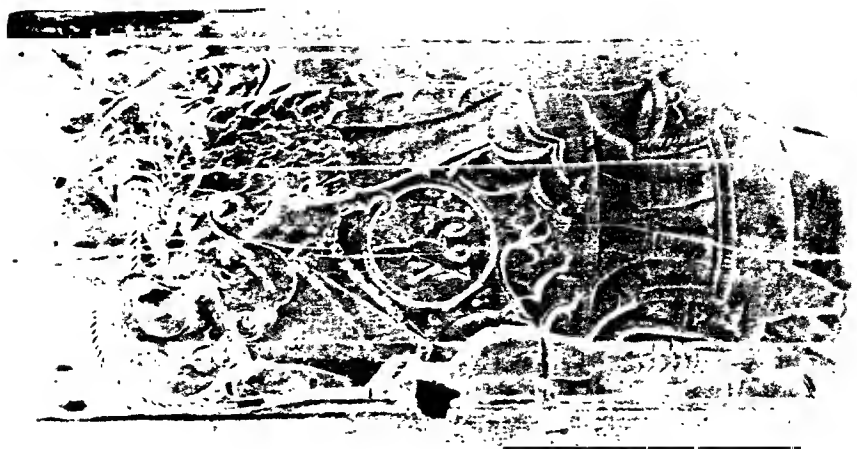
Mural painting at Trappan House: left-hand portion.

Given Copyright reserved.



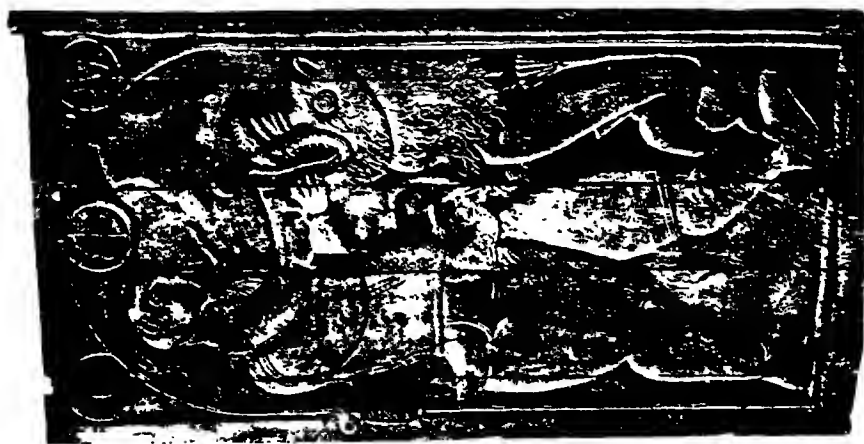
Mural painting at Traquair House: right-hand portion.

Craven Copyright reserved.



2. Oak door from Terregles House.

Crann Copyright asserted.



1. Oak door from Amisfield Tower.

MURAL PAINTING AND CARVED DOOR AT TRAQUAIR HOUSE. 7

quem at some time before 1600. In all probability this painting is to be dated towards the third quarter of the sixteenth century.

Oak Door.—In the room containing the mural may also be seen an oak door (Pl. III. 2) brought from Terregles House, Dumfriesshire, an historic building demolished about 1789 to make way for a modern mansion. This door has a special interest for us, since it has obviously been carved by the same hand as the door from Amisfield Tower in the same county that is now preserved in the National Museum. The Amisfield door (Pl. III. 1), which has been fully described in the *Inventory of Ancient and Historical Monuments and Constructions in the County of Dumfries*,¹ dates from 1600 and bears a representation of Samson in contemporary costume slaying the lion. Grose tells us² that the figures were coloured. Both doors show a conventional representation of a niche, probably derived from a memorial brass. In the Terregles door the niche-head is enriched with fleurs-de-lis and thistles. At the foot of the niche stands an elephant with a howdah, the harness being enriched with fleurs-de-lis. Above the howdah are carved two animals in combat, a unicorn on the left goring a lion on the right. The unicorn wears a collar to which is attached a chain. The chain is twisted round the animal's back and falls below the left hoof, where it ends in a swivel and ring. Within the ring are carved the initials L V H for William (Maxwell, 5th) Lord Herries, and the date 1601. This door is illustrated by Sir William Fraser in *The Book of Caerlaverock*.³

We desire to express our indebtedness to Mr D. S. Macdonald, W.S., F.S.A.Scot., for having obtained permission for us to publish the foregoing descriptions of the painting and the door: to the Royal Commission on Ancient Monuments (Scotland) for the use of their photographs for Pls. I, II, and III; to Mr W. Beattie of the National Library of Scotland for information concerning the painter's literary sources: and to Mr J. S. Richardson, F.S.A.Scot., H.M. Inspector of Ancient Monuments, for help and advice.

¹ P. 198.

² *Antiquaries*, i. p. 158.

³ Vol. i. p. 530.

II.

THE LAKE-DWELLING OR CRANNOG IN EADARLOCH, LOCH TREIG: ITS TRADITIONS AND ITS CONSTRUCTION. By JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.S.A. SCOT., Professor of Natural History in the University of Edinburgh.

Read January 31, 1942.

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1. LAKE-VILLAGES AND LAKE-HUTMENTS.

Lake-dwellings or crannogs of considerable extent have been found in many parts of Scotland, the structure and relics of which show that they were the settlements of small communities inhabiting groups of huts.

Such crannogs are widely distributed from Wigtownshire and Dumfriesshire in the south to Aberdeenshire in the east and Ross and Cromarty in the north, and information regarding them has been collected and some have been described in Dr Robert Munro's standard work on *Ancient Scottish Lake-dwellings* (1882). But there is another type of lake-dwelling, less imposing in size and appearance, which is represented in many highland lochs. At the present day it appears as an island, lying not far from the shore, round or oval in shape, projecting little above the water, so small that it could have carried only one or two small huts, and nowadays generally wooded. The artificial nature of such a lake-dwelling is generally revealed by the more or less regular arrangement of the stones of which it is composed, and on close inspection by the presence of submerged wooden piles on its outskirts. Some of these smaller lake-dwellings have been recorded by Robert Munro (1882) and notably by Rev. Odo Blundell, who used a diving-suit for the examination of the submerged structures, but who made no attempt to reveal by excavation the internal construction of these artificial islands (1909, 1910, 1911 and 1913).

If we regard the more imposing type of crannog as a lake-village, the smaller islands may be described as lake-hutments, and the lake-dwelling of Loch Treig belongs to the category of the lake-hutment.

2. THE ARTIFICIAL ISLAND, AND ITS RECENT EXPOSURE.

The Loch Treig island as it formerly appeared has been described briefly by Rev. Odo Blundell, who says that its size was "40 feet by 18, nor could it at any time have been much more than 60 feet by 30, the sides of the rubble construction being visible all round" (1910, pp. 30-32 and figs. 12 and 13). He gives a general account of the under-water appearance of the island and of the position of a few large beams of wood, which he observed from the surface by means of a "water-telescope."

So the island had remained for centuries until, in operations connected with the Lochaber Water Power scheme and the building of the dam across the River Treig, the northward extension of Loch Treig, in which the island lay, was temporarily drained and the island completely exposed. At that time, in June 1933, Mr Ben N. Peach, the Resident Engineer of the Laggan-Treig works, wrote to me at Aberdeen on behalf of the Consulting Engineers of the Power scheme, Messrs C. S. Meik and Halcrow, saying that when at the end of the year the dam was completed and taken into use the island would be permanently submerged, and that they considered that an investigation of the site might produce some interesting information regarding it and its occupation in former times. They further made the generous offer that they were prepared to put a small gang of their men on to do any necessary excavation and that their staff would

undertake all observations that were deemed necessary. It was an offer which I most gratefully accepted.

In July, with the help of Mr Peach and his staff, my son, Dr A. E. Ritchie, and I commenced and completed an exploration of the island, and I must record my deep gratitude to Messrs C. S. Meik and Halcrow, and particularly to Mr Peach, for the opportunity of carrying out this work, for their interest in its progress, and for the assistance which made a thorough examination possible.

It may be added that since this examination was made in 1933 the Treig Dam has been in use and the island has been submerged. But a recent temporary lowering of the water-level has revealed great disturbance of the bottom deposits of the loch, due to the currents set up by the powerful inrush of water from the Loch Laggan dam through its seven-mile-long tunnel, and in April 1941 I took advantage of the opportunity to re-examine the site and the dwindling remains of the island.

3. THE SITE CHOSEN FOR THE ARTIFICIAL ISLAND.

One of the striking prospects from the West Highland railway, which skirts its eastern shore along all its five miles, is Loch Treig, nestling in the shadow of the desolate mountains of Lochaber in western Inverness-shire. The loch fills a narrow valley, half a mile across, between two steep mountains reaching a height of 3658 feet on the western side, 3433 on the eastern, and, as its position suggests, the loch itself is very deep, 436 feet at its greatest, the ninth of Scottish fresh-water lochs in this respect. Its mean depth, 207 feet, points even more clearly to sudden depths and places it fourth amongst the averages of Scottish lakes.¹ Loch Treig, deep and wind swept, with steeply descending sides, is one of the most unlikely lochs to be selected for a lake-dwelling, which demands shallow and placid waters.

But its northern end, from which the River Treig flows to join the Spean at Tulloch two miles to the north, was in strong contrast to Loch Treig proper. This portion, known in Gaelic as *Eadarloch*—the “Loch Between”—was separated from Loch Treig by a sandy spit which almost divided the two, leaving only a narrow channel just over 20 feet wide (see fig. 1). The spit, now entirely washed away by the Laggan inflow, was formed superficially of sandy layers interbedded in which were shallow deposits, dark in colour, containing organic matter and the shells of hazel-nuts. The origin of the spit is referred to in the following section (4).

Eadarloch, thus separated from Loch Treig, was a narrow shallow extension, 1500 feet long by 360 feet broad at its widest part, with an

¹ For a description of Loch Treig see Murray and Pullar, 1910, vol. ii, p. 369, and vol. iv.

THE LAKE-DWELLING OR CRANNOG IN EADARLOCH. 11

average depth of little more than 10 feet and a greatest depth of about 23 feet in a hollow between the sand-spit and the island.

When the loch was drained, its floor was revealed as a slightly undulating bed, with several slight depressions, shown as pools in fig. 1, but with only two elevations which arose to within a few feet of the surface of the loch. One of these was selected as the site of the island, and the choice gives an indication of the special features which the builders

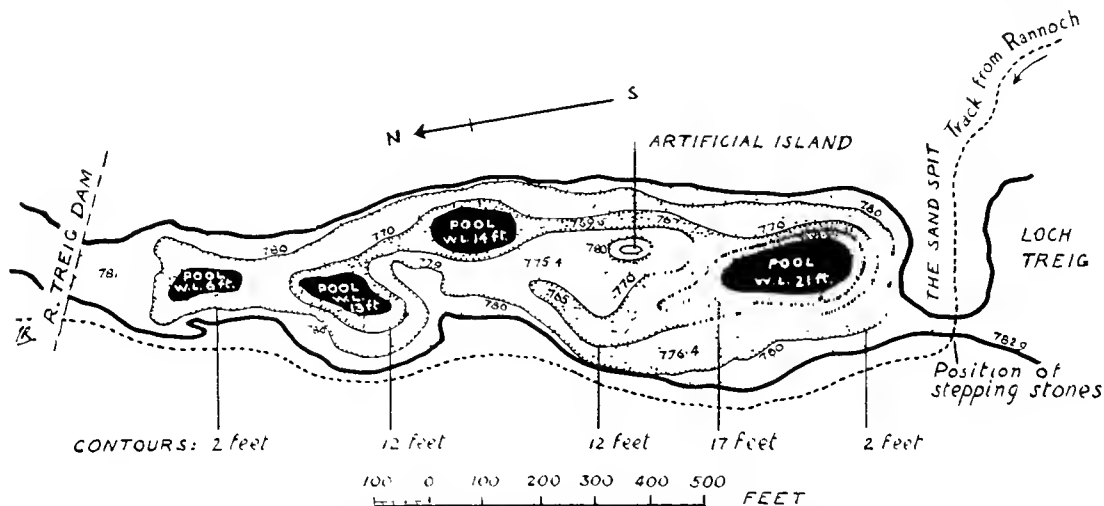


Fig. 1. Plan of the Eadarloch, at the north end of Loch Treig, showing position of crannog in relation to depths. The numbers 765-782.9 indicate feet above sea-level (O.D.).

regarded as desirable for their purpose and at the same time suggests the object they had in view.

One of the submerged elevations lay 200 feet off the western side of the loch and was a continuation of a short land spur which projected for 22 feet from the shore. Beneath the water it was connected with the shore by a ridge of sand covered by not more than 2 to 3 feet of water, and this was probably the chief reason for its rejection, since access to the site would have been a simple matter for man or wild beast.

The selected elevation was an almost symmetrical mound, which rose to an oval plateau, 65 feet long by 36 feet broad, at a level between 7 and 10 feet below the modern surface of the loch. Its centre lay 128 feet from the nearest point of the eastern shore and 208 feet from the western. It was surrounded by channels varying from 11 to 15 feet in depth, except on its northern side where the water was some 7 to 8 feet deep. These measurements represent the loch bottom as surveyed, but it is highly probable that some changes in the contour of the bed may have taken place, owing to the movement of silt, since the island was built.

Two main considerations appear to have influenced the island-builders in selecting this site. In the first place it offered a surface sufficiently large, and presumably near enough to the surface of the water, to allow constructions to be laid down without difficulty, a point of building technique to which I shall refer later. In the second place it was well defended on all sides by a considerable stretch of water too deep to be crossed by wading. The site had the added advantage that it was protected from the strong currents of the overflow of Loch Treig, which rushed by on its western side, or in winter spates expended their energy in the deep pool between the sand-spit and the island, and, breaking upon the mound upon which the island was pitched, were diverted along the channels on either side.

The Rev. Odo Blundell (1910, p. 32), handicapped by being compelled to observe through several feet of water, stated that natural rock projected from the bottom of Eadarloch, and that this was probably the foundation of the island which otherwise could not have survived the full force of the waters of Treig. While he rightly assumed that Loch Treig itself was unsuitable for the purposes of the builders, he was wrong in supposing that natural rock is exposed, and he failed to appreciate the part played by the sand-spit between the lochs, first, in bringing about the formation of the mound on which the island was built, and, second, in diverting the overflow from Treig past the island mound and forming a breakwater behind which the artificial island nestled in security.

4. HISTORY AND LOCAL TRADITIONS RELATING TO THE ISLAND.

In Loch Treig itself the shores, which dip steeply to a great depth, make the building of an artificial island an impossibility. The story of the modification of the northern end (where the bed-rock is still deep down below the surface), so that it came to form the Eadarloch and gave rise to the conditions of which the island-builders took advantage, goes back to the closing period of the Great Ice Age. At one stage in the slow disappearance of the glaciers of the Western Highlands, a dam of glacier-ice held up the waters in the valley so that they stood 78 feet (862 O.D.) above the modern surface of the loch. At the northern end of the Treig valley melting ice deposited moraines of gravel, which have been in part levelled into terraces prominent along the mountain slopes on the western side, and which also filled up part of the rock-basin of Loch Treig to form the shallow Eadarloch. The spit which separated Treig from Eadar, although its surface had been re-sorted by the waves into sandy layers, was an accumulation of morainic gravel, and Dr Murray Macgregor, Assistant Director of the Geological Survey, informs me that a boring made in the centre of the spit passed through $63\frac{1}{2}$ feet of gravel without reaching the rocky bed of the loch.

There is no substance in the suggestion in Rev. Odo Blundell's account (1910, p. 31) that the spit may have been formed by a land-slip subsequent to the building of the island, for its history and its presence are essential to the conditions which made possible the building of an island in Eadarloch.

The mound on which the island was built was of an unusual and quite



Fig. 2. Mound of vegetable debris on which the crannog was built and of underlying morainic gravel, as shown in a section on west side made by torrent from Loch Laggan tunnel (1941).

unexpected character. When the dam was brought into use the force of the enormous inflow from Loch Laggan tunnel cut deeply into the deposits of the loch and exposed the structure of the mound on all sides. As examined in April 1941, when the water was again low, it was seen to be a vast accumulation of vegetable debris more than 20 feet deep resting upon the glacial deposits (fig. 2). The materials of which it was composed were almost wholly needles of Scots pine, together with small fragments of branches and of the bark of birch and pine trees, and an occasional tree trunk. The pine needles were deposited in layers, one or two inches thick, separated by thin deposits of sand (Pl. XVI, fig. 4).

I submitted a sample of this strange deposit to Dr G. K. Fraser, Peat

Research Officer at the Macaulay Institute for Soil Research, Aberdeen, for his expert examination, and his report is as follows:—

“The vegetable matter is almost wholly Scots Pine remains which I estimate to form over 90 per cent. of the total. In addition there are small pieces of wood not of Scots Pine but as yet not certainly identified; an *Equisetum* rhizome; several pieces of the moss *Hylocomium loreum*; and pieces of charcoal, most probably transported since they are irregularly mixed with the material as a whole, and all so far examined of Scots Pine.

“I considered more information was likely to be obtained from a pollen-grain estimation and so ran in a general sample of the material with some other samples. The results are as follows:—

Pine (<i>Pinus</i>)	.	.	42.0	per cent. of total tree grains.
Ash (<i>Fraxinus</i>)	.	.	43.0	.. ..
Alder (<i>Alnus</i>)	.	.	5.5	.. ..
Birch (<i>Betula</i>)	.	.	5.0	.. ..
Hazel (<i>Corylus</i>)	.	.	3.5	.. ..
Elm (<i>Ulmus</i>)	.	.	1.0	.. ..

“Oak and Willow and probably Juniper and Aspen were noted once each in a general examination but did not appear in the count. Of the ‘non-tree’ grains Heather tetrads and Grasses each gave about the same figures as Alder. None of the other grains was noteworthy.

“I think the general conclusion to be reached is that pine forest was the abundant forest of the time, while Ash and to a much lesser degree Alder formed a fringe along the banks of the loch. I have never found Ash so frequent and this may be a sign of a very local Ash-wood only.”

This great mass of vegetable matter with its uneven bedding had clearly been swept together in an eddy formed behind the sand-spit by the flow from Loch Treig, and its volume, which must have been of the order of 70,000–100,000 cubic feet, presents a vivid picture of the ages during which the accumulation was forming and of the dense tree-growth (in an area now almost treeless) which had shed its leaves into the waters of the loch, or into the streams which fed the loch.

The thin seams of hazel luts which appeared upon the sand-spit itself may have been derived from contemporaneous bushes or from a deposit of hazel nuts varying from 18 inches to 3 feet in depth, which had accumulated on the western shore of Loch Treig and which was revealed by the Loch Treig tunnel excavations at a depth of some 50 feet below the normal water-level of the loch.

The island mound itself was formed at a time when, in the area, pine predominated in a mixed forest of pine, birch, ash, alder, hazel, and elm. The presence of fragments of pine charcoal may indicate the occurrence

of forest fires, but it is more likely to point to the presence of human inhabitants in the neighbourhood long before the lake-dwelling was built.

On this curious foundation, which was hidden beneath deposits of sand, and the nature of which was probably unknown to them, the builders constructed their artificial island.

It would be strange if so unusual a place as this solitary island, built in a portion of a deep and stormy loch in one of the wildest parts of the Highlands of Scotland, had remained unsung and unrecorded in the traditions of Lochaber. For the information gathered here I am indebted to the help of Emeritus Professor W. J. Watson and his former pupil Mr Lachlan MacKinnon, Gaelic master in Fort William School, and particularly to that keen observer, Mr Duncan Robertson, Head-Keeper at Curroul, than whom no one is more familiar with the traditions of that country-side.

The loch in which the island stood was invariably known as *Eadarloch* or, with the article, *an t-Eadarloch*, the "Loch Between," that is the loch between Loch Treig and River Treig. The name is printed "Idir Loch" in the large Ordnance Survey Map (6 inches to 1 mile).

By contrast the island itself and the dwelling upon it had several traditional names, which may have originated at different times and emphasised different stages in the use of the island. But of the sequence there is no record.

The earliest references to both occur in a Gaelic poem, *A'Comhachaig*—the Owllet's Song—written by a famous poet Domhnall MacFhionnlaigh—Donald Mackinlay—who flourished about A.D. 1600. The poet tells how, for the first time uninvited through forgetfulness or by design, he made his way to share in a feast on the island, only to find that by the time of his arrival on the opposite shore the feast was well started. There was nothing for him to do but return to Fearsaid, probably the place near an Dubh Lochan, marked Fearsaid Mhór on the 6-inch Ordnance Survey Map, and the site of the dwelling of Angus of Fearsaid in the fifteenth century (see below). On his journey back he communed with an owl, and the striking and plaintive "Owlet's Song" was the result. Since these references to the artificial island, its dwelling, and its neighbourhood in the early seventeenth century are significant, some of them are quoted here, as translated by Professor W. J. Watson.

The poet speaking of his visit says:

"I and thou, gray hound, sad is our journey to the Island"

and

"If Donald were left out alone from Tigh nam Fleadh (House of Feasts),
barely is a bubble complete when the cow-men will be in."

a reference to the house upon the island and the use to which it was put.

The owl replies to Donald's queries:

- v. 2. "I am of an age with the Oak, that was once a sapling in the moss,
through many an age have I lived."

an allusion which may point to the presence of aged oaks in the neighbourhood about 1600: none grow there now, although oak timbers were found in connection with the island.

- v. 7. "I have seen Alastair Carrach, the goodliest man in Alba; often did
I listen to him when he arranged the hunting knolls."

- v. 8. "I have seen Angus after him; he was no meaner choice. 'Twas in
the Fearsaid was his dwelling, and he made a mill on Allt Laire,"

the stream that runs by Inverlair.

- v. 9. "Many a warfare and spoiling was in Lochaber in those times."

Alastair Carrach (v. 7) was Alexander Macdonald the progenitor of the Macdonalds of Keppoch, fourth son of John, Lord of the Isles to Princess Margaret of Scotland. He fought at Harlaw in 1411 and died about 1440. Angus (v. 8), his son, known as Aonghus na Fearsta, Angus of Fearsaid, which lies about $1\frac{1}{2}$ miles north of the island, died at Fersit about 1484. The statement that these were times of warfare and spoiling in Lochaber lends point to the protective purpose of the lake-dwelling in the fifteenth century.

That the island was regarded as an important landmark is indicated by another verse in which the owl explains where its ancestors were hiding during those troublous times: the poet assumes that the island was in existence in the fifteenth century.

- v. 10. "The great part of my ancestors were between the Island and the
Fearsaid, others of them were about the Deabhadh [see below],
they would be crying of an evening."

Although the poet does not name the island other than as "the isle," he calls the dwelling upon it *Tigh nam Fleadh*—the House of Feasts—and indicates that it was a sort of special meeting-place.

In commenting upon "The Owllet's Song," an anonymous writer, Diarmad, in a Gaelic article in *An Gaidheal* (vol. v, pp. 330, 331, November 1878), gives his own description of the place. "The north end of Loch Tréig, where the river rises, is called An Déabhadh. A little way below the Déabhadh, the Tréig spreads itself out into a marshy broad standing pool, as if it were taking rest before it begins to race and leap down to Inverlair. This pool is called An t-Eadarloch. Right in the middle of the loch is seen a small island, some call this sort of islet a crannog. In this island is the site of Tigh nam Fleadh (the House of Feasts), and there Mac Mhic Raghnaill used to hold any special meeting with the nobles of

the district. Beside the Fearsaid Riabhach is seen the site of Tigh na Fuine (the Bakehouse), and in time of drought may be seen the stepping-stones that led to the island."

An Déabhadh, the "soft crossing-place between two lochs," clearly indicates the spit of sand and boulder-clay between Lochs Tréig and Eadar. Fearsaid Riabhach—the "Brindled Sand-spit"—apparently named in contrast to Fearsaid Mhór, which lies near An Dubh Lochan between Eadarloch and Inverlair, would also suitably describe the spit between Lochs Treig and Eadar, for the surface of the spit was formed of layers of sand interspersed with dark layers of organic matter containing many hazel nuts, so that denuded by the waves it would appear parti-coloured or "brindled." Here too, visible when the loch was first drained and marked on the 6-inch Ordnance Survey Map, were stepping-stones, continuing, across the narrow strait of water between the lochs, the mountain track which led from Rannoch to Glen Spean (see fig. 1). But if these are the stepping-stones he referred to, Diarmad was wrong in saying that they led to the island, for the island was surrounded by water too deep for passage on foot, and the stepping-stones offer no kind of approach. The reference to Mac Mhic Raghuaill signifies that the Chiefs of Keppoch in general used the island for special councils.

Most of the names of the island that have been preserved are, like "Island of the House of Feasts," derived from the dwelling upon it. Thus the 6-inch Ordnance Survey Map names it *Eilean Tigh na Slige*, and tradition, according to Duncan Robertson, *Eilean Ruighe na Slige*, the "Island of the Shell Sheiling." That might suggest that the dwelling had been a domed hut like a limpet-shell, and, although there is little to confirm such a suggestion, we did find during the excavations a large post-hole in the centre of the island, which might well have held a tree-trunk as the central support of such a structure.

Another traditional name, according to Robertson, was *Eilean Tigh nam Fiodh*, the "Island of the Wooden House," but the most interesting and suggestive of all the names was *Eilean Ruighe na Slighe*, which Mr Lachlan MacKinnon translates as "The Island of the Sheiling of the Track."

The track would be the mountain track which led from Rannoch to Glen Spean. It hugged the eastern side of Loch Treig, near the northern end of which it left the loch to skirt Creagan Fàraidh—the "Ladder Crag"—then descended to the sand-spit and stepping-stones between Lochs Treig and Eadar, and continued along the western shore of the latter (see fig. 1). In the wild days when, as the following section will show, wolves proved a constant danger to travellers in this district, and elsewhere in Scotland hostels were erected to shelter benighted travellers from the danger of their attacks, a "sheiling of the track" in so lonely a place would

have become recognised as a harbour of refuge for honest travellers in a dangerous country-side.

The only name which has survived as applicable to the island itself, apart from its dwelling, is *Eilean na Comhairle*, the "Council Island," and perhaps a later version of that name is "Keppoch's Council Island," recorded by the Rev. Odo Blundell (1910, p. 32). Of it he says: "This island has long been known as Keppoch's Council Island, from the fact that Ronald Og, Chief of Keppoch, used to meet his clansmen there when he was in hiding in the cave above Loch Treig on account of the part he had taken in the insurrection of Sir James MacDonell of Islay." Sir James Macdonald, it may be recalled, escaped from Edinburgh Castle in the summer of 1615 through the help of Alexander of Keppoch and his son Ranald, and it is possible that the last and not Ronald Og, who died in 1587, was the refugee in the cave.

In any case "Council Island" signifies a secondary purpose to which the island was put, since the labour involved in the construction to be described would never have been undertaken for the convenience of occasional consultations. The name points to the much earlier origin of the island.

Duncan Robertson says that the island was sometimes called the Treaty Island, and that a local tradition is that when two chiefs had a dispute they came up on opposite sides of the loch and swam to the island to settle their difference, but if one or other failed to reach the island he lost his case.

5. THE PURPOSES OF THE LAKE-DWELLING.

The traditional accounts of the island and its hut lay stress upon its social character, as a place of feasts, a meeting-place for deliberation by the wise men of the clans, or for the settling of disputes between chiefs. If these were its only or its main purposes it is odd that the site should have been so carefully chosen, for the only reason to recommend such social use of an island would be that the feasts or deliberations or disputes might be carried on without interruption from outsiders. Such a reason seems to be insufficient to warrant the tremendous planning and labour involved in the creation and constant upkeep of the island.

On the other hand the choice of the site is significant. Although another place in the loch was available the one selected was peculiar in that it was almost surrounded by channels ten feet or more deep. Clearly the purpose was protection, and judging by the limited surface above water, protection for a limited number of people, a family or two families at the most. But protection from whom or from what?

The suggestion that springs to the mind is that it was a place of refuge, sheltering its occupants from sudden attack in a troubled country-side or

from casual raids by wandering clansmen. It could scarcely have withstood a planned attack in force, for its garrison must have been small, and it was within easy range of an arrow from the shore: but boats could not readily be carried to the spot or improvised there, and a swimmer was an easy mark in the water. So that the inhabitants could rest there with their possessions, comparatively safe from the petty thief or even the more determined raider.

But there was an equally or even more pressing need for protection when the lake-dwelling was built. Its timbers show that where the hill-sides in the neighbourhood are now bare, there flourished forests of mixed woods, great pine trees and oaks, besides abundant and enormous birches some more than a century old. Even in the sixteenth century these and other Scottish forests were haunted by packs of wolves, to the great danger of travellers and the concern of the authorities, who erected on the forest tracks hospices, hospitals, or "spittals," where benighted travellers might find refuge. Of this district it is recorded by the Stuarts that in 1848 there were still living in Lochaber old people who related from their predecessors that, when all the country from the Lochie to Loch Erroch was covered by a continuous pine forest, the eastern tracts upon the Blackwater and the wild wilderness stretching towards Rannoch were so dense and infested by the rabid droves that they were almost impassable (1848, vol. ii, pp. 231, 232). And one of the brothers Stuart states that "on the south side of Beann Nevis, a large pine forest, which extended from the western braes of Lochaber to the Black Water and the mosses of Rannoch, was burned to expel the Wolves" (published under the name of James Hay Allan, 1822).

The need for protection against the ever-present risk of attack from wolves was probably a contributing reason for the building of the island, for a stretch of 100-200 feet of deep water gave security which no land dwelling could offer. Wolves existed in these parts till perhaps the middle of the seventeenth century: in 1621 the price paid in Sutherland for the slaughter of a wolf was fixed at 6L. 13s. 4d., and Sir Robert Gordon in 1630 says that the forests of that county were, amongst other creatures, "full of roid deer and roes, woulffs, foxes and wyld cattis." Certainly the lake-dwelling was made long before wolves were exterminated in the district, although it is quite likely that its occupation, continuous or casual, may have been carried on after its original purposes had vanished.

6. DESCRIPTION OF THE ISLAND.

(i) *Its Superficial Appearance.*

The normal water-level of Eadarloch was 783 feet above sea-level, somewhat lower than the level of Loch Treig. Normally the island, as it

existed in recent times, must have been all but submerged (see fig. 1), but at low levels of the water surface it appeared as an elongated oval, the levelled surface of which had a maximum length of $45\frac{1}{2}$ feet and a maximum breadth of 28 feet. This surface, on which grew reeds and grass and two small clumps of birch trees, rose very slightly above the water, the highest point, on the south-eastern side, projecting only for a couple of feet, while the water lapped a great part of the western margin. The levelled surface, underneath the vegetation and superficial sand and humus, was a mass of stones, and the sides, which sloped gently down into the water, were also built of rounded water-worn pebbles, gathered from the shores of the loch. It was noticeable even on superficial examination that the boundaries of the stone-work were irregular, and that the levelled surface toppled away to the west side where the sides of the mound were steepest.

It is clear that the modern condition could scarcely have represented the state of the island when it was inhabited, for as I have described it, it must frequently have been submerged when the mountain torrents were running in spate into Loch Treig.

Exposed by the draining of Eadarloch, the island revealed itself as apparently a great oval heap of rounded stones and boulders (Pl. IV, figs. 1 and 2), resting upon layers of sandy silt which covered the mound of vegetable debris. The stony heap stood about 8 to 10 feet high, with a broad base 60 feet long by 40 feet broad, from which the sides sloped gently inwards to the levelled top. The stones upon the slopes were roughly graded, smaller water-worn pebbles forming the upper slope, and larger rounded stones with rare angular blocks being interspersed with smaller pebbles on the lower half or two-thirds of the slope. The gradation appeared to be designed, but it may have been contributed to by the sorting action of the water currents which for centuries had played around the island.

The superficial stone-work dominated the outer appearance of the island, and it was only an occasional projecting end of a baulk of timber or an upright post that gave any hint of the elaborate internal structure which was exposed by subsequent excavation (see fig. 3). Munro remarks that there are many artificial islands "still extant in several of our Scottish lakes, which appear to be entirely composed of stones and earth irregularly heaped together" (1882, p. 242), but the misleading appearance of the surface of the Treig island is a warning against the acceptance of the evidences of superficial examination.

(ii) *Plan and Sectional Survey of Island.*

Before excavation was begun a survey of the island and its surroundings was made with the invaluable assistance of Mr Lyall of the Resident

Engineer's Staff. Some of the results are shown in figs. 2-7, which include a plan, a longitudinal section, and three cross-sections of the island, with

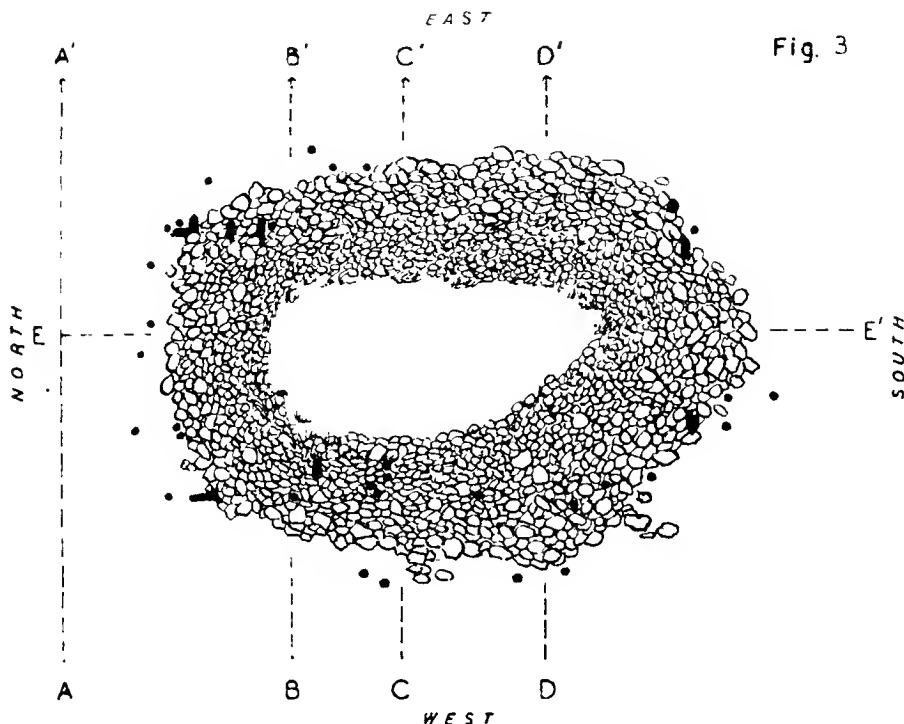


Fig. 3

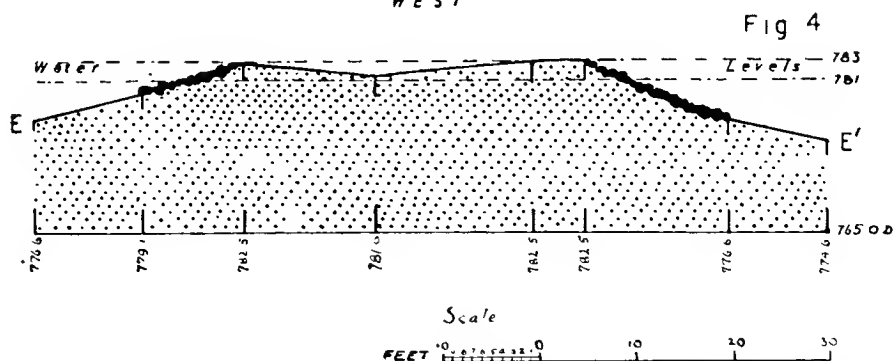


Fig. 4

Fig. 3. Plan of crannog, showing relation of dwelling surface to stone slopes. Projecting beams and posts indicated in solid black.

Fig. 4. Outline of longitudinal section of crannog at EE'.

one section of the bed of the loch, 11 feet to the north of the limit of the stone facing.

The plan (fig. 3) shows the oval island, seemingly formed of an accumu-

lation of loose stones, broad at the base and rising to form a relatively small surface on which the inhabitants dwelt. It also shows the position of a number of wooden structures of two kinds—the ends of a few beams which in every case projected horizontally from the stone slopes, and upright posts arranged approximately in rows. On the west side this arrangement was most clearly preserved; here two rows were indicated, one projecting from about the middle of the stone slope, and the other projecting from the bed of the loch beyond the limit of the stones. Subsequent excavation showed that each row marked the position of a wooden framework which the posts were designed to keep in position.

A longitudinal (N.-S.) and almost median section of the island is represented in fig. 4. At this part the outer margins of the island were at the same level, but the centre was slightly depressed. Although the stone slope was more extensive on the south, both it and the northern slope were roughly symmetrical, lying respectively at angles of 22° and 17.5° with the horizontal. We can, therefore, regard the long axis of the island, lying parallel with the flow of the current, as having preserved its original contour except for the depression towards the centre, even if it may not have preserved its original level in relation to the surface of the loch.

The cross-sections (W.-E.) reveal a different story (figs. 5-8). Each of these shows a tilting of the surface towards the west, and an increasing steepness of the western stone slope, which reaches its greatest in the most northerly section. Thus, whereas the longitudinal surface remains level at its extremities 45 feet apart, the cross-section DD' falls away towards the west 0.6 feet in 8 feet, CC' 1.3 feet in 16 feet, and BB' 2.8 feet in 18 feet. And while the eastern stone slopes of these sections retain angles about normal, of 19° , 14.5° , and 22° respectively, the western slopes show an increasing tilt from 22° at the southern end of the island to 27.5° at the middle, and 35.5° at the northern end.

It is obvious that some disturbance has caused a settling of the island on its western side, most marked at the northern end, and the source of this disturbance was most likely the main current from Loch Treig which flowed along this side of the island.

Moreover, the settling was due not to any significant tilting of the wooden framework upon which the island was built, for the timber upper platform remained almost level. It must therefore have been caused by the action of the current in disturbing the packing of the island, which consequently settled in the spaces between the wooden framework. This was confirmed by the surface at the section BB', where although the greater part of the surface had a tilt of 5° to the horizontal, in the outer 4 feet the tilt was increased to 11° , although the wooden framework of the upper platform showed no change in level from east to west.

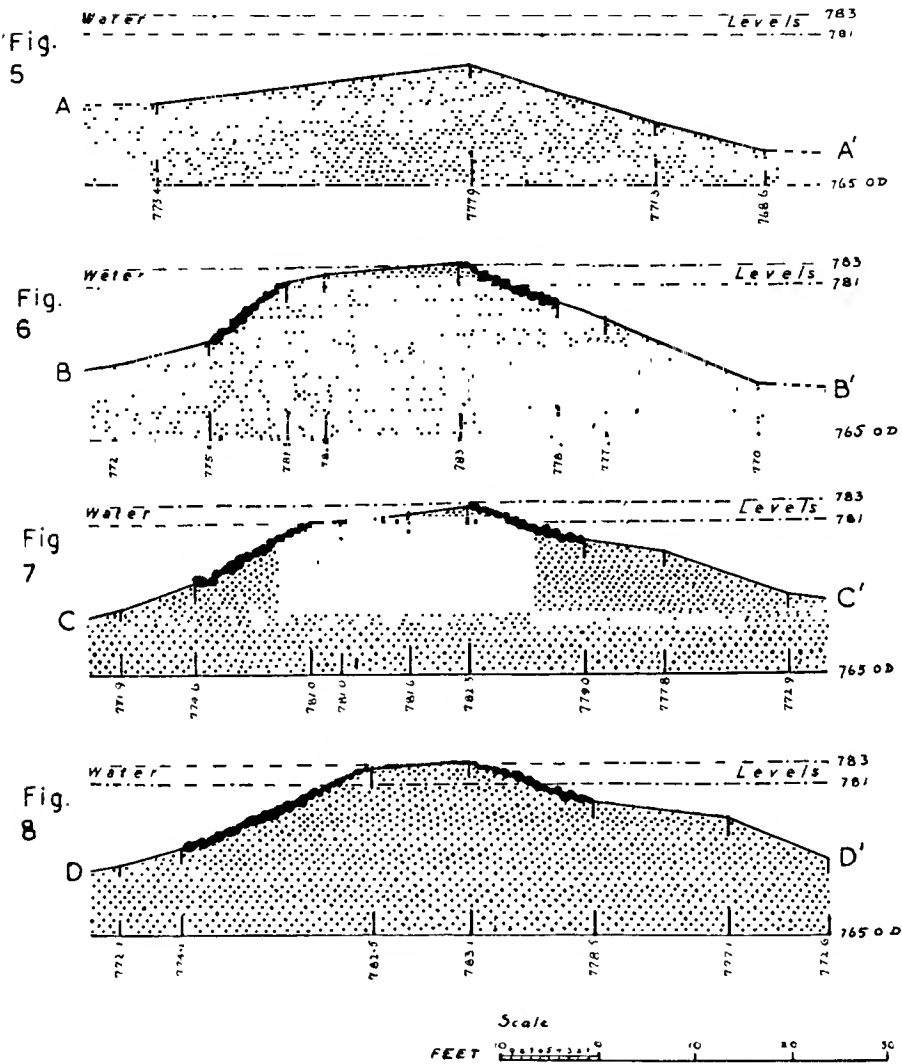


Fig. 5. Outline of bed of loch at AA', immediately to the north of the crannog.

Fig. 6. Outline of cross-section of crannog at BB', north end.

Fig. 7. Outline of cross-section of crannog at CC', middle.

Fig. 8. Outline of cross-section of crannog at DD', south end.

(iii) *Relation of Surface of Island to Water-level.*

The highest point of the surface of the island was 784 feet above sea-level, but its general level was only about 782 feet and at some places it dipped to 781 feet.

These elevations must be considered in relation to the water-levels in the lochs. The waters of Loch Treig proper vary greatly with rainfall. Thus, although the Ordnance Survey found the level to be 783.9 feet above sea-level on 13th July 1868, it was 787.0 feet when Sir John Murray completed its survey on 29th May 1902, an unusually high level due to preceding rains. The surveyors associated with the British Aluminium Company's works found the greatest height reached by Loch Treig proper to be 786 feet above sea-level, and at that time the level of Eadarloch, also at its greatest, was 785.6 feet. Under such conditions the artificial island must have been well under water. Many readings in Eadarloch were taken by the surveyors, and it may be considered that the usual flood-level there was 784.0-784.5 feet, and the normal level 783.0-783.5 feet.

Therefore, whether we consider flood or normal level, the island as it stood in recent years must have been almost continuously and almost wholly submerged.

Clearly the present cannot represent the original condition of the island. I shall show that part of the change has been brought about by the subsidence of the island itself, but there was probably a second contributory factor. The level of the surface in Eadarloch is ultimately regulated by the level of the sand-bar over which the outflow passes into River Treig. This was about 781 feet O.D. and was attained by a gradual rise in the bed of the loch from a level of 775 feet at its northern end. On the sectional drawings (figs. 4-8), in addition to the normal level of 783 feet, I have indicated this level of 781 feet to show how the island would have appeared had the outflow from the loch come to a stop, say in times of extreme drought. Even then the island would have been almost uninhabitable.

I suggest therefore that there is every likelihood that a change has taken place in the level of the sand-bar at River Treig itself, and that in times of spate the currents of the loch may have been slowly transferring sandy deposits from the bottom to heap up fresh accumulations at the outflow. A lowering of the bed at this point by 2 feet, added to an allowance for the amount of subsidence traceable in the island itself (see p. 28), would have raised the whole inhabited surface about 2 feet 6 inches above normal water-level, and that is probably about the height at which the island originally stood. At this height the surface would still have been well above normal flood-level.

7. THE STRUCTURE OF THE LAKE-DWELLING.

(i) *The General Type.*

The lake-dwellings which have been investigated in this and other countries have been essentially built about a skeleton of wood. But the

character of the skeleton as well as the purpose it served have varied from country to country and perhaps also from time to time. In the oldest form, predominant in Central Europe in the Neolithic and Bronze Ages, erect trunks of trees or piles, firmly embedded in the lake-bottom, formed a foundation of posts upon which a stout level platform of tree-trunks or planks was laid, at a level several feet above the surface of the water, and on this platform the dwellings were built.

In the second type erect piles were reduced to a secondary purpose, and the main foundation had become a series of isolated wooden sections, each rectangular in shape and formed of horizontal wooden beams laid alternately at right angles, as in a log-cabin. Erect wedge-posts rather than piles were used at the corners of these sections simply to keep them in place, and at a suitable level a platform of heavy beams and planks for the huts was laid over the tops of the sections. This type was in use during the Early Iron Age in Northern Germany and France.

In a third type the use of a foundation of heavy timbers, either as piles or compartments, had been abandoned, and instead the exposed platform, upon which the dwellings were built, rested upon a succession of layers composed of brushwood, branches, and stems of small trees. Piles were driven through these masses as they accumulated to prevent them from floating or drifting. Occasionally represented in the lakes of Central Europe, these structures are known as fascine islands.

From these types, which depended almost solely upon wood as a foundation, a fourth type made a notable departure. Stout timbers, either dressed beams or natural trunks of trees, formed the skeleton of the artificial island; but these were held in place partly by upright posts but mainly by masses of stones and earth with intervening layers of brushwood and branches, and the dwellings themselves were erected on a substantial foundation of stones and earth. Indeed to all appearance such an island is an enormous heap of stones, the woodwork being almost entirely concealed. Piles, or rather wedge-posts, were used to keep the timbers in place, and, although it has been stated that such islands were surrounded by a stockade of piles, it is possible that the appearance of a stockade was in some cases a fortuitous one. The Scottish and Irish lake-dwellings or crannogs belong to this last type.

No detailed description of the construction of such as the Loch Treig artificial island has been published, and I have therefore given a reasonably full and illustrated account of a structure which may probably be taken as typical of the smaller lake-dwellings most common in Scottish freshwater lochs and which is representative of a distinctive development in the building of lake-dwellings, even of the Scoto-Irish type.

The excavations were planned to expose representative sections in different parts of the island, but it will lead to a better understanding of

the construction if, instead of a chronological account of the work, a description is given of the units which composed the island from the surface down to the foundation, as revealed by the excavations as a whole.

(ii) *The Superstructure on which the Dwelling was placed.*

The exposed part of the island upon which the dwelling was placed consisted of a great accumulation of stones, earth, and a considerable amount of decayed vegetable matter, which together reached a depth of from

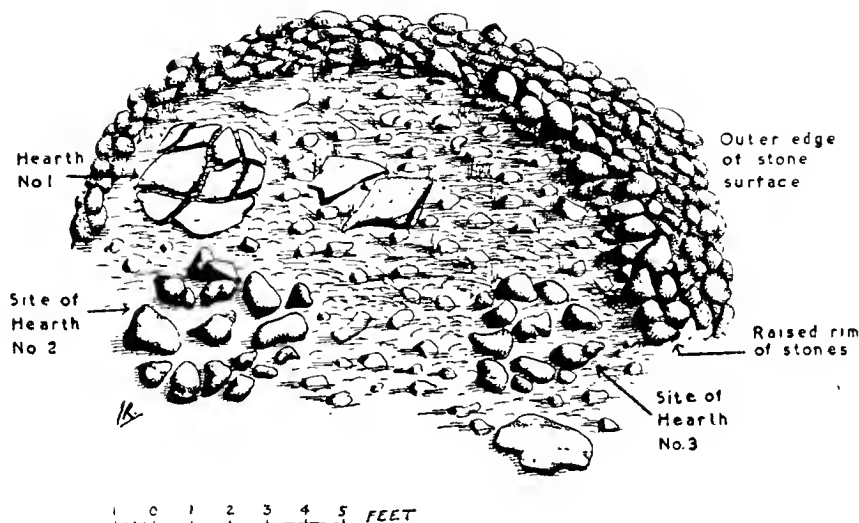


Fig. 9. Uncovered surface at north end, showing position of raised rim of stones and surface hearths.

3 feet 3 inches to 4 feet 3 inches (see Pl. VI, 1). This superstructure sloped inwards towards its upper surface, leaving available for the dwellings an oval area about 33 feet long by 15 feet broad at its widest. The dwelling surface, exposed by the removal of the grass and reeds which covered it, and the silt and organic debris upon which they were growing, was roughly levelled but was very irregular, as if owing to subsidence especially in the south-western portion. It was formed of closely packed water-worn stones, very unequal in size, mostly 4 to 6 inches across but often twice as large. Where the edge of the level surface was unbroken, as at the north-east end, larger stones formed a slightly raised rim just within the margin of the island (fig. 9), and a possibility is that this acted as a boundary to contain a layer of heather and moss which was used to carpet the surface, and which, although it had entirely disappeared as such, had contributed to the organic debris amongst the stones. The remains of such layers were discernible in the upper two feet of the superstructure, indicating

former levels of occupation, but otherwise there was no trace of orderly arrangement. The stone and earth superstructure was not of uniform thickness. It reached its greatest depth of about 4 feet 3 inches across the middle (E. to W.) of the island, and this was due to the sagging of the wooden platform upon which it was supported, and to additions of new material made to keep the surface level at a suitable height above water (see figs. 13 and 14).

At the foundation of this considerable mass was a uniform layer, 3 inches deep, of brushwood, formed of closely compressed bundles of heather with long stems (see Pl. XVI. 3).

Hearths.—On the cleared surface near the north-west corner was a hearth of flat slabs of schist, fitted together to form an area roughly oval, 3 feet by 2 feet 2 inches (fig. 9 and Pl. V. 1). Fragments of charcoal still lay upon the hearth, which was built up on water-worn stones arranged in a rude circle, and since there were two other groups of stones similarly arranged at the north end, near which lay large slabs of schist, these were probably also the sites of hearths (Pl. V. 1. and fig. 9). The practice of raising the hearth above the general level was not uncommon; witness the elevated clay hearths of which more than 200 were found at Glastonbury Lake Village (Bulleid and Gray, 1911, vol. i. p. 58) or the clay hearths at Lochlee crannog (Munro, 1882, p. 73 *et seq.*). It would have the advantages of convenience for cooking and of reducing the danger of setting alight the heather carpeting of the hut. At Loch Treig the more usual clay foundation, which was also characteristic of the Swiss lake-dwellings, was replaced by a setting of large pebbles.

At the surface level no further hearths were found other than the three at the north end, but later excavation discovered several at lower levels. The fourth hearth lay about 1 foot below the first and a little to the south of it, a single large flat slab of schist, 2 feet 9 inches in length, 2 feet 2 inches in breadth, and 6 inches thick. This stone had been cracked by heat, and on its surface lay several fragments of calcined bones.

Just below the level of the fourth hearth but east of it lay a fifth rectangular slab of schist, 2 feet by 1 foot 6 inches across. The last of the hearths was in the north-east corner, at a depth of 2 feet below the surface of the stones. It was formed of three slabs of schist, closely fitted together and covering an area 3 feet 6 inches by 2 feet 6 inches; on its surface lay sand and earth which had been burnt. Charcoal was found at a depth of about 2 feet in other parts of the island, but no other hearths were discovered. The scattered charcoal may indicate that one of the earlier habitations had been destroyed by fire.

The levels of the successive hearths are significant. I have pointed out that the normal water-level of Eadarloch was 783 feet above Ordnance Datum, so that in modern times all the hearths were generally under water,

the surface hearths Nos. 1 and 2 by as much as 2 feet. The discovery of hearths at different levels each covered, not by the natural accumulations which often submerge hearths, but by gatherings of stones and earth, shows that during the period of its occupation the island was sinking and had time and again to be replenished to keep its surface sufficiently clear of the water.

From the position of the hearths the total extent of this sinking can be calculated with reasonable accuracy. The deepest hearth at the north-west corner was about 1 foot 6 inches below the surface, which itself was almost 2 feet below the normal water-level. So that an elevation of 3 feet 6 inches would bring this hearth just clear of the water. Of course that would not be sufficient for comfort or practical purposes, but if, as I have suggested (see p. 24), the water-level was originally some 2 feet lower than at present, then a lift of 4 feet would have raised the lowest hearth in the north-west corner 2 feet 6 inches clear of the original water-level and clear of ordinary flood-level in those days.

At the north-east corner where subsidence was less marked a hearth was found 2 feet below the surface, and here an elevation of 2 feet 6 inches would, under the assumed conditions, have raised this hearth also clear of the water even at ordinary flood-level.

Since its construction therefore the surface of the island must have subsided at least 2 feet 6 inches at its north-eastern and 4 feet at its north-western corner, and during the period of its occupation the subsidence was at least 2 feet in the centre of the island, where as I shall show later (p. 37) the under-structure appears to have given way.

(iii) *The Dwelling.*

Very little is known about the buildings which surmounted the artificial islands, and accordingly in the course of the excavations special look-out was kept for any indication of posts or post-holes which might indicate the numbers and shape of the habitations. Unfortunately, so complete had been the destruction of the superstructure that no trace remained.

It must have been a timber construction, as one of the Gaelic names of the island suggests (see p. 17), and it must have been built of relatively light timbers and woodwork to have disappeared so thoroughly. Only a few pointers regarding it were gathered. In the first place the hearths were confined to one part of the island; had there been several huts there would most likely have been hearths distributed over the surface. In the second place, at the centre of the dwelling surface was a large circular hole rather over 1 foot in diameter (Pl. V, 2) which at first I thought might have been a well. But a well upon an island in a fresh-water loch would be superfluous, and I concluded that the hole was a post-hole which

had contained an upright tree-trunk of considerable girth. The suggestion is that this substantial pillar may have been the central support of the dwelling. Close by the hole was found a short length of trunk with one end burnt, and although it was not found *in situ* this may have been the remains of such a support, in which case it would indicate that the dwelling had been destroyed by fire. No post-holes were found elsewhere on the dwelling surface. In the third place, all the traditional names of the dwelling use the Gaelic words *Tigh* or *Ruighe*, house or sheiling, in the singular.

Such evidence points to the probability that the island bore a single wooden dwelling of moderate size, and not a collection of small huts or tents, and the likelihood is that the dwelling was somewhat tent-like, the roof rising to a point near the centre of the island. The name *Ruighe na Slighe*, Sheiling of the Track, is suggestive of the unassuming character of the structure.

The only evidence so far recorded of the hut of a Scottish lake-dwelling favours this probability. Munro discovered the stump of a stout oak pile in the centre of a crannog in Lochan Dughail, near Balinakill in Argyllshire, associated with post-holes in radiating beams, which clearly formed part of a circular dwelling-house (1893, p. 213, and 1899, p. 334). The hut was "a large, circular, tent-like structure, 32 feet in diameter, constructed of wood, and supported by one central and some twenty surrounding uprights" (1893, p. 221). I surmise that the Treig dwelling was of somewhat similar construction, but oblong instead of circular (see Pl. XIX). Traces of a hut at Kilbirnie crannog, Ayrshire, were oblong, but there is no indication of how the roof was supported (Munro, 1882, p. 64).

(iv) *The Upper Platform.*

The superstructure of stones, earth, and the remains of artificial layers of vegetation, which I have described above, rested upon an elaborate level platform of timber, 57 feet long by 30 feet broad. The presence of this platform was indicated in the unexcavated island by stout horizontal timbers which in a few places projected from the rubble sides. These relics varied in level from 777·8 to 780 feet above O.D., but some were obviously displaced by sinking and one by tilting, and the level of those clearly in their original position was close to 779 feet O.D.

The platform level, therefore, was at least 2 feet below the water-level of Eadarloch, even if we assume that that level was lower in former than in recent times. There can be no doubt that this submerged position was a deliberate device to ensure the preservation of a structure so important in the composition of the island, for timbers kept in a constant medium, whether it be wet or dry, resist decay much longer than those subjected to alternations of dryness and wetness.

Here we have a notable divergence from the typical lake-dwellings of the Continent, for in the various types of these—pile, basement, or fascine—the upper platform was built well above water-level and directly carried the huts. The Scottish lake-hutment type was distinctive in having an under-water wooden platform: this carried a huge mound of stones and earth, on which the hut in turn was built.

Some of the timber framework of the platform was well preserved considering its age, but, as might be expected, the outer exposed ends of the majority of the trunks had decayed away, and even in the centre of the island some of the wood had disappeared or was in an advanced stage of decay. Sufficient remained, however, to reveal the construction of the platform, which was examined wherever it was exposed and particularly at sections made at the north end and the centre of the island.

The platform was constructed, first, of a heavy framework solidly built and in many places pinned together, and, secondly, of a floor or mass of loose timber laid in short lengths across the underlying framework.

The Framework of the Upper Platform.—The materials used in the construction of the framework were trunks of pine or birch trees. These were either trimmed and sometimes slightly squared, or more frequently were simply rough trunks with the branches cut short. There was a close approximation to standardisation in the conduct of the work, for most of the beams were about 31 feet long, although occasionally a corresponding space was traversed by two beams of between 15 and 16 feet. The trees selected were remarkably straight and showed little taper, suggesting that they had been cut in a dense and well-grown forest.

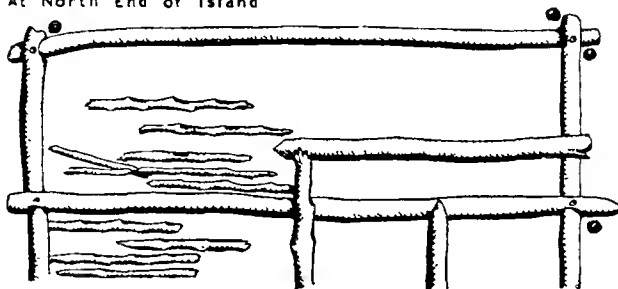
The framework was built methodically and on sound principles of construction. This may be illustrated by two typical areas—at the north end of the island, and at the centre (fig. 10). At the north end the outmost cross-beam of the framework, a trimmed trunk, 31 feet long by 1 foot in diameter, was first laid down: upon it rested, about 1 foot from its extremities, two longitudinal beams each about 30 feet long. Rigidity was given to the arrangement through the interlocking of the beams at the point of crossing by means of a deep square half-check cut in each, and a dowel hole through each junction showed that wooden dowel-pins had secured the positions. The second cross-beam, unlike the outer, from which it was 6 feet distant, *rested upon* the outer longitudinal beam. It was a half-length timber 16 feet long by 1 foot in diameter; its inner end was wedge-shaped—to key into a notch in the corresponding beam on the west side which was missing. The outer end was not fixed in any way to the longitudinal beam, and I suspect that this beam had moved southward about a foot from its original position. The third cross-beam, 32 feet long by 1 foot in diameter, rested upon the outer longitudinal beams, with which it was interlocked by corresponding half checks pinned at both ends,

the distance between these two fixed cross-beams (that is cross-beams 1 and 3) being 9 feet (fig. 10 and Pl. VI. 1).

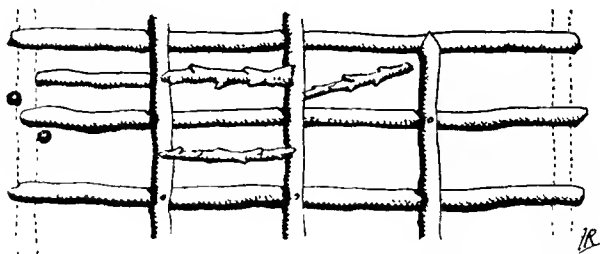
This was not a typical arrangement, for at the centre of the island, where careful excavation showed the relative position of the cross-beams even although some were decayed and friable, the distance between successive cross-beams was regularly 4 feet. In every case where a cross-

WOODWORK OF UPPER PLATFORM

At North End of Island



At Centre of Island



Scale 1 2 3 4 5 6 7 8 9 FEET

Fig. 10. Woodwork of upper platform—at north end and at centre of crannog.

beam was observed in position its outer ends rested upon the two outer longitudinal beams (Pl. VI. 2).

The method of building the framework of the upper platform was therefore as follows:—

First, the two outmost cross-beams were laid down at the north and south extremities of the under-structure; secondly, upon these two cross-beams and fixed to them were laid the outer longitudinal beams, 28 feet apart; thirdly, the remaining cross-beams were laid upon the outer longitudinal beams, to which they were generally, but not always, fixed by checks and dowel-pins, at distances of approximately 4 feet apart; finally, when the cross-beams were in position three sets of inner longitudinal beams were laid upon them fixed in places by checks and dowel-pins, and spaced at

distances of approximately 7 feet from each other and from the outer longitudinal beams. These distances are given as approximate, because, although they may be regarded as the normal spacing, the distance had sometimes to be modified to conform with an irregularity in a tree-trunk. For example, on one beam two adjacent checks were only 6 feet 5 inches apart.

In the heavy timbers of the framework, which were generally about a foot in diameter, well-preserved examples showed the deep checks to be carefully cut with an iron tool (see Pl. VII, 2 and 3), and the dowel holes which were roughly $1\frac{1}{4}$ to 2 inches in diameter were made by burning. The beams of the framework were not pinned at every crossing, but I could trace no system in the arrangement of such dowel holes as could be distinguished. On an average a dowel-pin was inserted at about every third cross-beam.

The dowel-pins themselves are worthy of special notice because of the skilful device adopted to prevent them from slipping or turning after they had been driven home. Instead of being round they had been roughly squared by an iron tool, and the sharp edges of the square had been dressed away so that in section each pin was eight-sided, with four larger faces separated by four smaller faces (see Pl. XIV, 1, *c* and *d*). The result was that when the pin was driven into a round dowel hole made by burning, the eight angles of the pin bit into the charred surface of the hole and made an immovable fixture.

The character of the timber used in the upper platform is indicated by one large pine trunk in which, although it was not perfect, 106 annual rings were counted, and the presence of such a tree is a suggestive commentary on the nature of the woodland in the district when the island was built. This elaborate and heavy framework, bound together to give a certain degree of rigidity, must have contained about 600 cubic feet of timber and weighed in air about 13 tons.

The "Floor" of the Upper Platform.—The beams of the framework, where they were complete, measured from 30 to 32 feet in length, or in a few cases half that length. But there were found about the platform a number of timbers, usually lengths of natural trunks or stout branches of birch or pine, which were much shorter; in the centre of the island where they were best preserved they measured 8 feet long, and in the north end, where they were probably partly decayed, 6 or 7 feet. They were very unequal in girth, ranging from 3 or 4 to 9 inches in diameter. They invariably lay parallel with the cross-beams, and their length and the position of the few which remained undecayed showed that they were meant to span the space between the longitudinal beams.

Thus a rough surface of short sections of branches or trunks formed a sort of uneven floor upon the framework. It seemed natural to suppose



1. Side view of Treig Crannog, from West.



2. End view of Treig Crannog, from South.



1. Hearth No. 1.



2. Post-hole.



1. Section at North End, showing Upper Platform, etc.



2. Framework of Upper Platform at centre.



1. Beams of Framework at centre.



2. End of Cross-beam.



3. Fallen Cross-beam.



1. Brushwood packing.



2. Platform Frame, Upright Wedge-post, Intermediate Timber, etc.



1. Intermediate Timbers exposed.



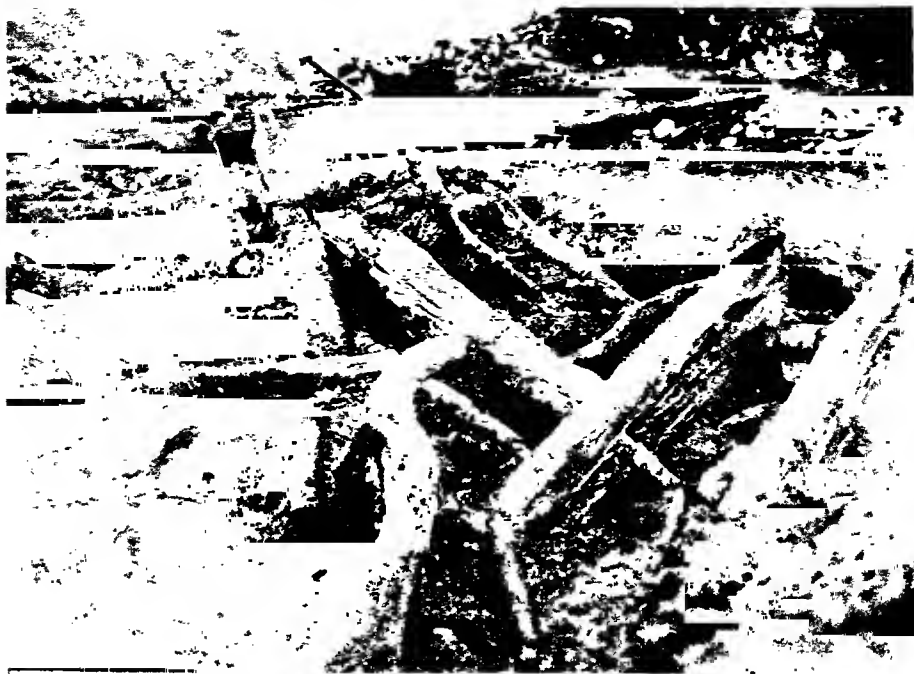
2. Intermediate Timbers and packing of earth and stones.



1. Basal framework, N.W. corner.



2. Basal timber lattice, S.W. corner.



1. Part of basal lattice, North End.



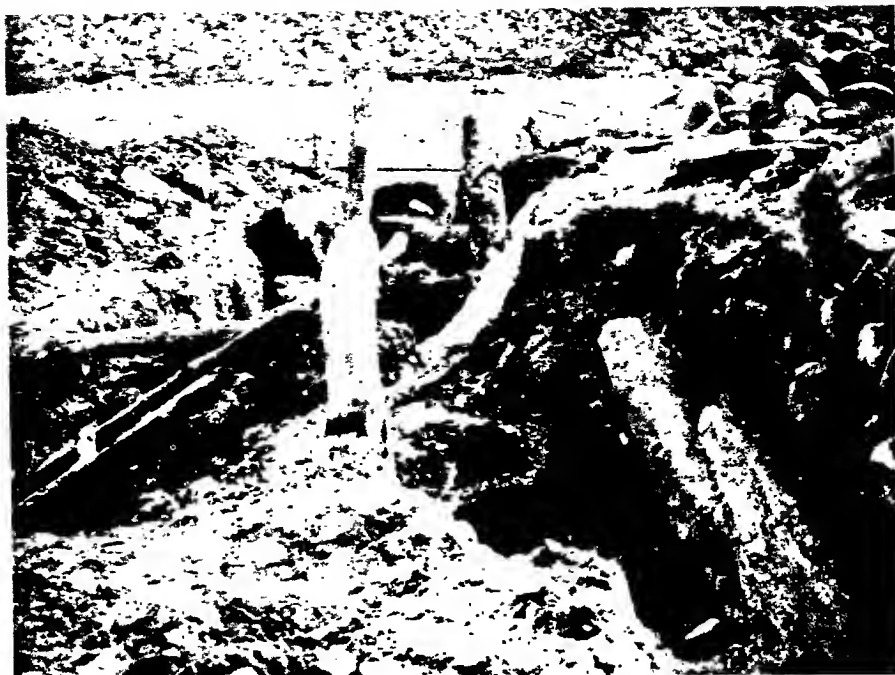
2. Key-point of wedged timbers, from S.



1. Key-point of wedged timbers, from N.



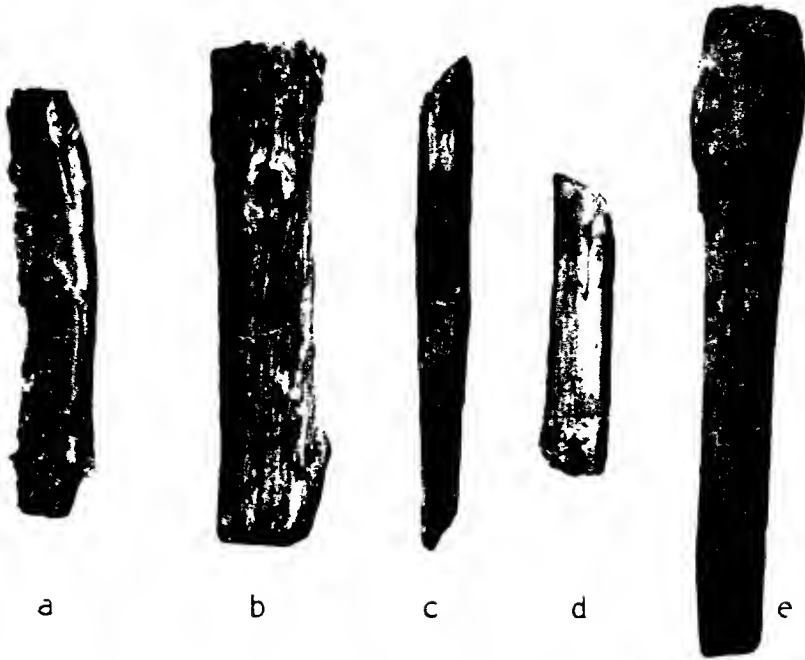
2. Birch posts deflected by pressure.



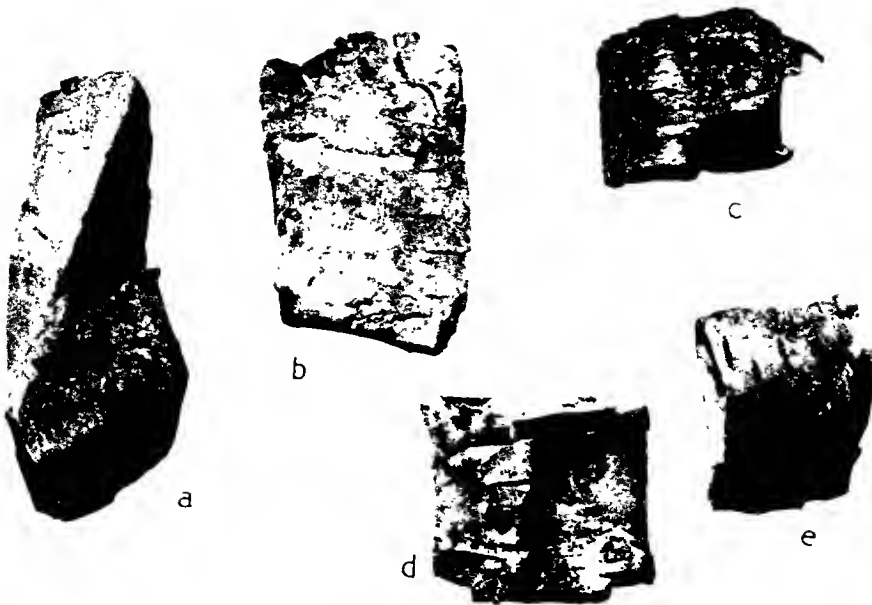
1. North end, early stage of excavation.



2. Remains of Ladder for access to island.



1. Wooden dowel-pins and peg.



2. Adzes, and birch-bark rolls.



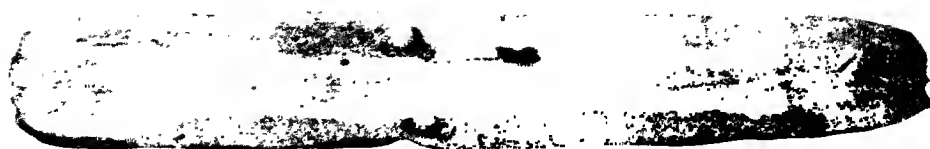
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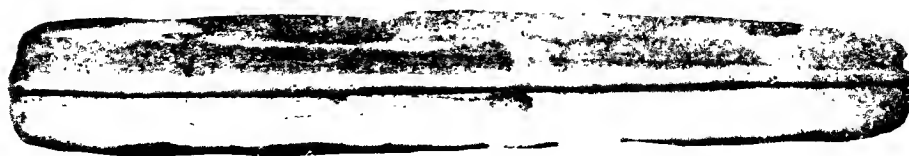
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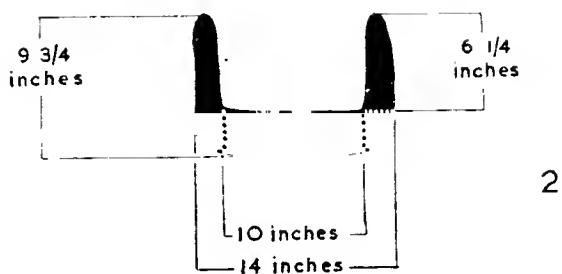
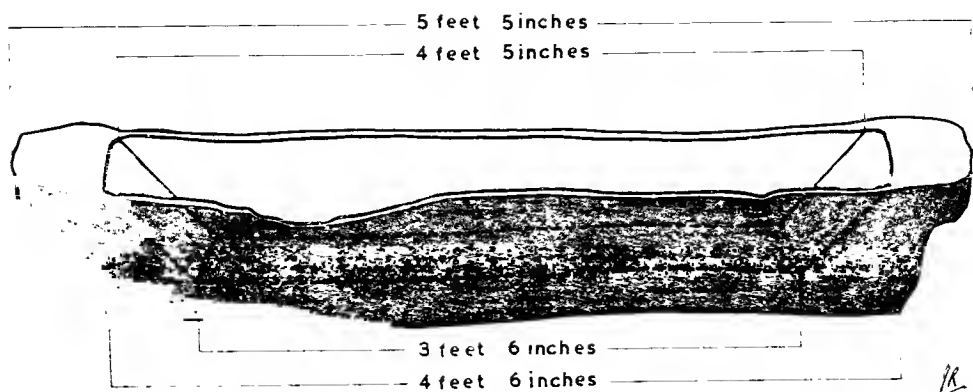


4



5

1, 2. Dug-out vessel of oak.
3, 4, 5. Various views of single-piece canoe of oak.



3

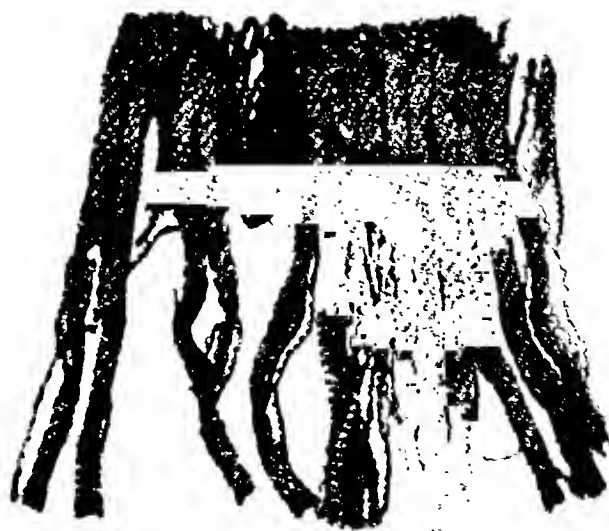


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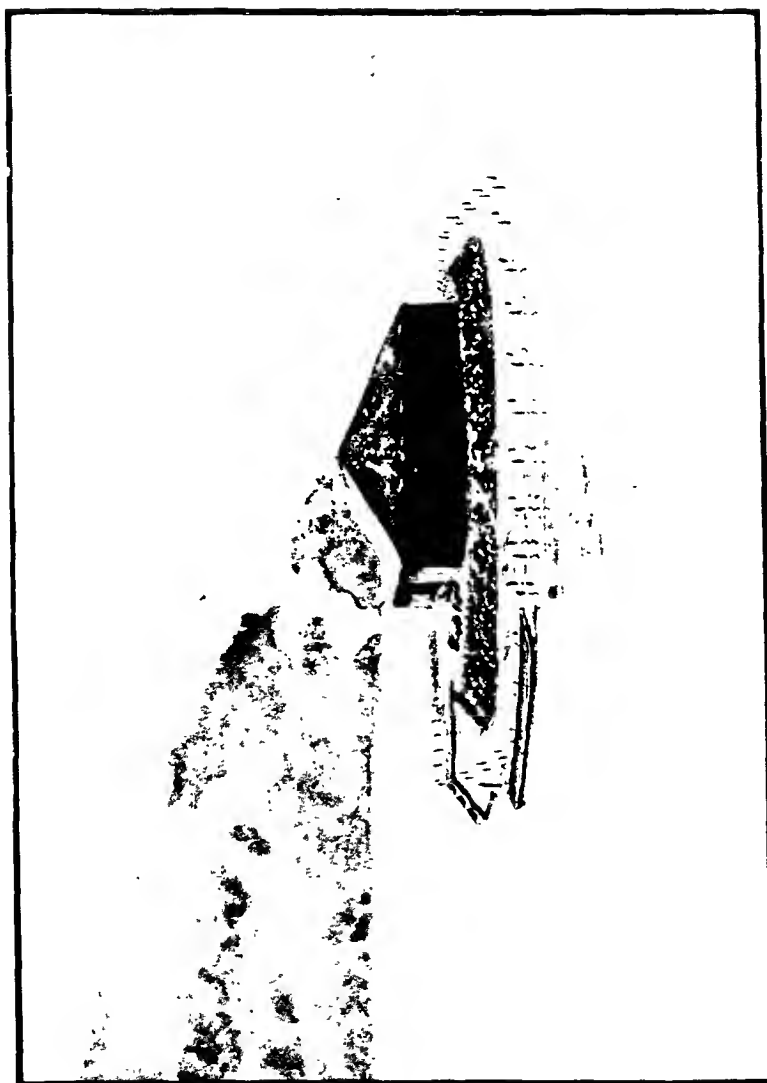
- 1, 2. Dug-out vessel of oak, dimensions.
3. Sample of brushwood layer.
4. Vegetable debris forming mound on which crannog was built.



1. (Upper): Metal implements.
2. (Lower): Wooden points.



1. (Upper): Leather shoes.
2. (Lower): Woollen fabric.



Reconstruction of Lake-dwelling in Loch Tweig.

that these were horizontal ties or stringers, which would add to the rigidity of the platform, but there was no evidence that they were fixed in any way to the framework, and we must take it that they were simply laid in place upon each pair of longitudinal beams, solely for the purpose of forming a floor to support the superstructure of stones and earth. They are shown in the reconstruction (fig. 11) as rather sparsely set across the spaces of the framework, as the excavations indicated, but it is possible that in the original condition of the platform they were more closely set as a sort of continuous floor planking.

The Method of Fixing the Platform in Position.—Before excavation began the preliminary survey showed a number of projecting upright posts, arranged in two series, distant about 7 feet from each other, the inner series projecting from the stone sides of the island, the outer from the silt just beyond the limit of the stone-work.

Plotting of the positions of the inner series showed that the posts were in two rows, about 2 feet apart, and the uncovering of the upper platform revealed their purpose. The posts were straight natural birch stems, 6 inches or a little under in diameter, still with silvery bark upon them. Several were found in their original positions in relation to the framework, firmly driven into the underlying material, and placed in diagonally opposite angles formed by the intersection of the cross-beams with the outer longitudinal beams (see figs. 10 and 11).

Their purpose therefore was to hold the upper platform securely in position and eliminate the danger of lateral shift. They were obviously placed there after the platform was safely resting upon its bed, and could not have been used to fix a floating platform down, for their position was erect, so that in water the platform would simply have floated upwards without hindrance.

Reconstruction of Upper Platform.—From the information given above and gathered during the excavations I have drawn a reconstruction of the Upper Platform (fig. 11), in which is indicated in solid black surrounded by a line the woodwork—beams or posts—visible before excavation commenced. I have not endeavoured to make the framework fit all the posts which were exposed and whose positions were plotted in the original survey, for some of these had been displaced by movements of the material in the island. But accepting the positions of the beams and posts which were evidently in their original positions, I have applied, throughout, the measurements made in the portions exposed, namely 4 feet between cross-beams and 7 feet between longitudinal beams. The result fits so nearly with the observed positions that the reconstruction may be taken as approximating closely to the original. The size of the platform framework was 57 feet long by 30 feet broad; it contained 15 cross-beams and 5 longitudinal beams.

A glance at the reconstruction shows that originally the upright posts fixing the platform in position must have resembled, as they projected from the stone-work, a close-set two-rowed palisade surrounding the island.

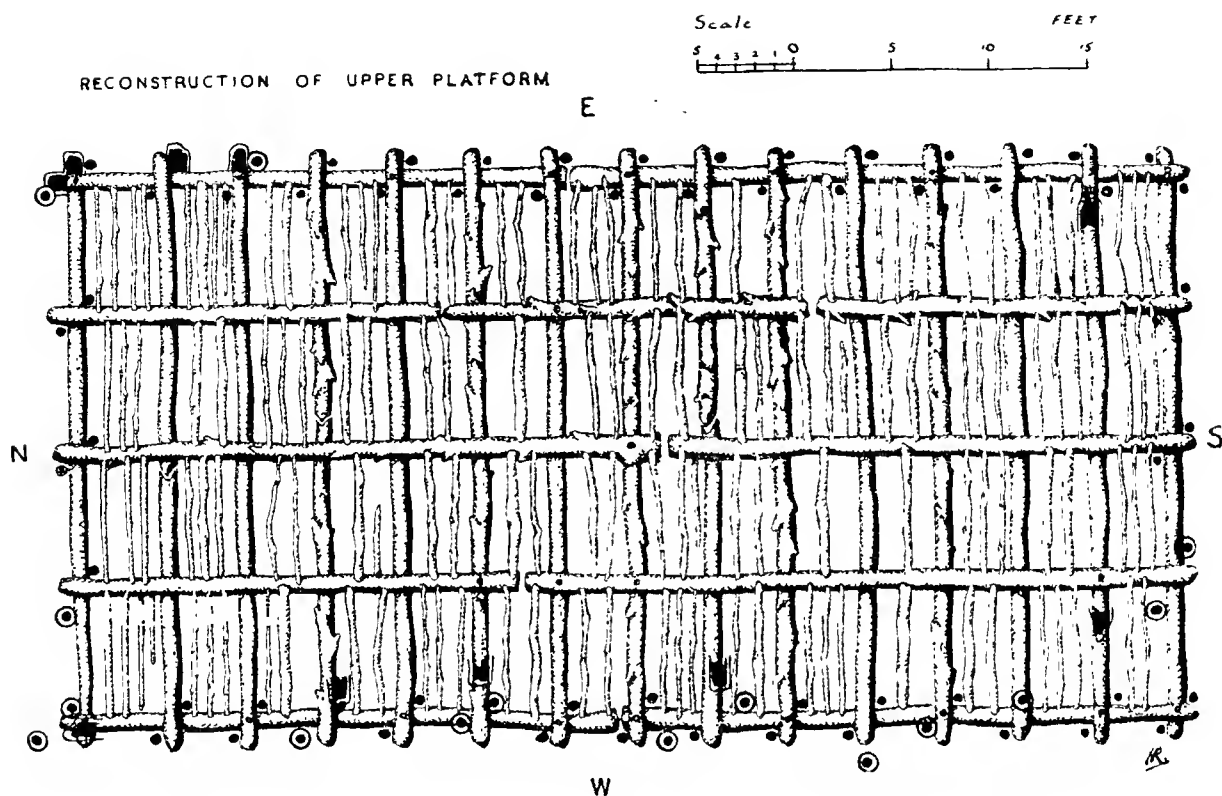


Fig. 11. Reconstruction of upper platform. Black dots indicate supposed positions of upright posts. Black ends of beams and dots, surrounded by a line, show actual positions of beams and posts visible before excavations began.

(v) The Bedding of the Upper Platform.

The Upper Platform may be regarded as the central feature of the island: upon its level surface was piled the mound on which the dwelling was perched, beneath it a foundation had to be laid, the double purpose of which was to raise it to a proper level and to give it unshakable stability. That this under-structure had to be carefully planned and elaborately built is scarcely to be wondered at since it had to bear a weight which in air amounted to approximately 13 tons of timber framework, not including the "floor" logs, and in addition about 250 tons of stones and earth. Even under water when the island was inhabited the pressure on the under-structure must have been about 150 tons.

The bedding of the upper platform was not uniform throughout the island, although a general plan of construction was evident. Everywhere the framework of the platform rested upon a bed of vegetation, 3 to 6 inches deep, almost completely composed of heather stems with bracken inter-mixed, tightly packed and compressed beneath the beams (PL VIII. 1 and PL XVI. 3).

The heather and bracken bed rested upon a mass of stones and earth, variable in depth at different parts of the island, but generally showing

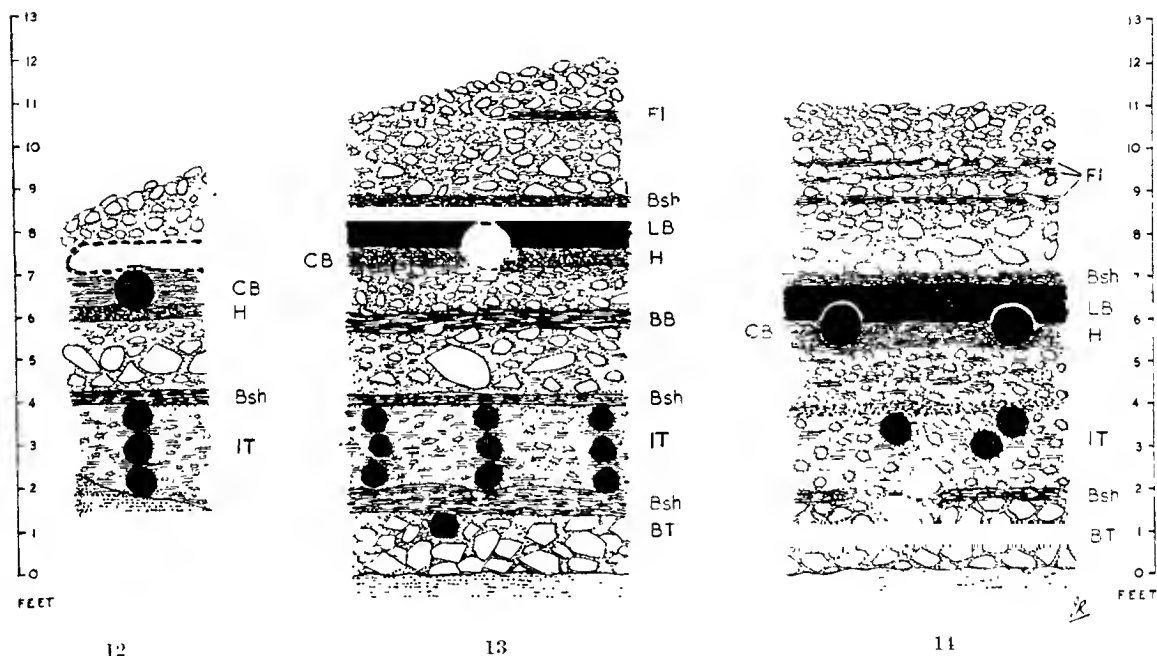


Fig. 12. Vertical section (N-S) of crannog at position of outmost cross-beam at north end. Depth indicated in feet from zero, which is at 771 feet O.D. FL, old floor levels; Bsh, brushwood layer; LB, longitudinal beam of upper platform; CB, cross-beam of upper platform; H, heather and bracken layer; BB, layer of birch branches; IT, intermediate timbers; BT, basal timbers.

Fig. 13. Vertical section (N-S) of crannog at position of cross-beam 3 from north end. Lettering as above.

Fig. 14. Vertical section (N-S) at centre of crannog. Lettering as above.

a rough scheme of arrangement. Thus at the extreme north end of the platform, where the stone-and-earth layer was only 1 foot 8 inches deep, the uppermost 6 inches contained small water-worn pebbles 6 to 8 inches in length, followed by a layer containing large stones 1 foot across or more, some rounded and water-worn others irregular and angular (see fig. 12).

Under the third cross-beam, that is 9 feet from the north end of the platform, where the original condition of the interior was best preserved,

the stone-and-earth layer was 3 feet deep, divided into two horizontal sections by a layer of broken birch branches 3 or 4 inches deep. The upper section, 1 foot deep, contained fairly uniform stones, the lower, 1 foot 6 inches deep, included some large boulders one of which must have weighed over 400 lb. (see fig. 13 and Pls. VIII and IX).

In the centre of the island the stone-and-earth layer was only 1 foot 4 inches deep, and, intermingled with water-worn stones which were mostly smaller than usual, 3 to 4 inches across, was a great deal of broken and decayed brushwood, although no definite layer survived such as occurred in the section previously described (see fig. 14). At this part of the structure considerable disturbance and compression had taken place (see p. 37), and I suspect that the brushwood mixed amongst the stones represented in part the remains of the missing layer of broken branches.

The final constituent in the mass upon which the platform rested was a much compressed layer of brushwood only 3 to 4 inches thick, well shown in the sections represented in figs. 12 and 13 and less definite in the centre of the island (fig. 14), owing probably to the exceptional sinking of the stone-and-earth packing in this region.

The layers upon which the platform was bedded rested in their turn upon an elaborate timber construction which I have called the "intermediate timbers."

(vi) *The Intermediate Timbers of the Island and their Support.*

The upper platform, the central feature of the island, was between 7 and 8 feet above the bed of the loch, and the builders were aware that a mass of stones and earth of that height, however closely packed it might be, could not long withstand the effects of the great pressure above and of the strong currents which in times of spate rushed along its sides. It was deemed necessary therefore to fortify the understructure against both of these forces, and this was done by including in it an elaborate and carefully planned arrangement of timbers, which underlay the whole area of the platform and extended just beyond its northern end.

The timbers were almost all natural birch trunks, with the branches lopped off close to the stem and with the bark still showing silvery upon many of them. Most ranged in diameter from 7 to 10 inches, but exceptionally large individuals measured 20 and 21 inches in diameter, and in one of these 118 annual rings were counted. That birch trees more than a century old and of such dimensions should have grown on the neighbouring hillsides is itself an astonishing fact, and it is equally noteworthy that the birch trunks were as straight and regular as the stems of pine trees.

The trunks were laid in parallel series or tiers, each consisting of three, or occasionally two, trunks placed one above the other, but separated from each other by thin packings of brushwood (Pl. VIII, 2, and Pl. IX). These

tiers were set at right angles to the flow of water outside the island, so that, like groins on a sea-beach, they would protect the material between them from silting out. Thus they lay in an east to west direction, parallel to the cross-beams of the upper platform, and with these beams they had an interesting relationship in position, which pointed to careful planning in the construction of the woodwork.

The tiers uncovered were spaced at a distance of 2 feet 8 inches from each other, except at the extreme north end of the island where the distance was slightly greater. The selection of so odd a spacing seemed curious, but its significance was apparent when it was recollected that the alternate cross-beams in the upper platform were 8 feet apart, so that at a space of 2 feet 8 inches every third tier of the intermediate timbers corresponded to a cross-beam of the upper platform. The greater distance between the tiers at the north end was probably devised to accomodate the odd distance of 9 feet which separated the first two alternate cross-beams.

The tiers were held in position by packed earth amongst which was a good deal of brushwood, but stones were smaller and fewer than in any of the other stone-and-earth layers. The presence of a few upright posts of birch associated with the tiers suggested that the sets of trunks were supported by uprights while the earth was packed between them. But it was noticeable that the large boulders referred to in the description of the lower part of the superincumbent layer (p. 36) were frequently placed directly above a tier as if to keep it in place.

Munro mentions a similar use of large stones in the crannog at Lochan Dughaill in Argyllshire, where "a row of biggish boulders followed the circumference of the mound to an extent of about 4 yards, as if intended to keep down and consolidate the underlying woodwork" (1893, p. 213).

Reference must be made to an irregular arrangement of the trunks of the intermediate timbers, which appeared in a section at the centre of the island (see fig. 14). The trunks were obviously displaced, and one may have been missing from one of the tiers shown in the figure. This displacement strengthens the inference drawn from the greater building up of the stone-and-earth superstructure of the platform at this part (see p. 27), and from the compressed layers beneath the upper platform itself--that here unusual sinking had taken place in the island, a result being that the platform itself lay 2 feet below its normal level.

(vii) *The Bedding of the Intermediate Timbers.*

Throughout the whole area, except at the extreme north end, the tiers or ranges of trunks and the earth packing which lay between and supported them rested upon a layer of brushwood several inches thick (from 4 to about 8 inches).

Such a layer, however, would not have prevented the tree-trunks, under the enormous pressure bearing upon them, from eventually sinking in the sandy layers of the bottom of the loch, and so throwing all the upper construction out of alignment. This danger was avoided by two devices.

In the first place the brushwood bed lay upon a strong foundation of large stones and earth, in which the stones predominated and earth made a relatively unimportant packing. There was no trace here of brushwood or vegetation (see figs. 13 and 14). This stone foundation covered an area which lay under, and corresponded roughly with, the area of the upper platform, but it did not extend to the outer works of the island, to be referred to later.

In the second place additional support was given to the upper structures by horizontal squared beams lying below the brushwood layer and resting upon the stones. They were placed lengthwise and crosswise, but, so far as I could judge, did not preserve any definite relation to the arrangements of the tiers above them, the cross-beams sometimes lying directly beneath a tier, sometimes appearing below the space between two tiers. The level at which these beams were found showed that they formed part of the basal timber structure described below.

(viii) *The Basal and Outlying Timbers, and their Foundation.*

Of the units composing the island the construction of the basal timber framework was the most difficult to elucidate. This was owing partly to the large area covered by it and to the fact that a great part of that area was buried deep at the base of the island, so that interpretation depended largely upon inferences drawn from the more exposed portions lying outside the island slopes. But the difficulty was more due to the actual disappearance of many of the timbers and to the displacement of others in these outlying positions through lapse of time and the wear and tear of the loch currents.

I have mentioned that our first survey showed two series of upright posts, the inner of which was associated with the upper platform, whereas the outer projected from the sand beyond the stone limits of the island. These suggested the presence of a second framework which had to be fixed in position, and accordingly excavations were made beyond the margin of the apparent island, along the west and east sides, at a very complicated and interesting part of the north side, and on the south side, particularly at the south-east corner to discover whether special methods of strengthening were employed at key points.

The basal and outlying timbers included a horizontal framework, shoring beams, and lattices of criss-crossing stems and branches, which are described below.

The Basal Framework.—The basal framework was a rectangular construction, of which squared beams, running parallel with the short and the long axes of the island, were found on the north and on the west sides a few feet beyond the outer margin of the stone-work, but always at a lower level. The usual length of the larger squared beams was 9 feet, but some were 12 feet long or even longer.

On the west side the original arrangement was best shown. Here there was no appearance of physical disturbance, for two beams about 12 and 17 feet long lay horizontally and in line, parallel with the edge of the upper platform. They supported, at distances of 12 feet apart, four beams at right angles, which also were horizontal, except one which was displaced, dipping outwards at 5° to the horizontal. Smaller timbers underlay the crossing places as an additional support. The woodwork here was not of the usual natural trunks, but although much decayed was generally of roughly squared timber, 8 inches across and 7 inches deep (see Pl. X. 1). It rested upon a brushwood layer composed of heather, bracken, and small birch branches. Erect posts placed in the angles of intersection for fixing the position of the cross-beams were found at two points.

On the east side the basal framework had been much disturbed: none of the beams remained horizontal, the cross-beams being tilted upwards towards the island at small angles of 5° , which suggested accident rather than design. The four cross-beams discovered lay at successive distances of approximately 6 feet, 6 feet, and 12 feet from each other. No trace of the longitudinal series was found in position on the east side, although it was probably represented by two beams which lay across the others as if they had rolled down from their original position. The beams here rested upon a brushwood layer which ended just beyond the outer end of the second cross-beam, that is it spread for a distance of some 11 feet beyond the margin of the stone sides of the island.

On the south side no trace of the basal framework was definitely identified, unless it was represented amongst the mass of timber present at the south-west corner (see fig. 15 and Pl. X. 2). But here an interesting trunk was found which showed the method of checking for the interlocking of beams and of notching for receiving a shoring strut (Pl. VII. 3). This was clearly a trunk from the upper platform which had rolled out of place, and was probably the outer cross-beam on the south side. On the north side two or three beams, all of squared timber of the cross series, remained in position, the line of the north end of the framework being clearly marked by the end of the terminal beam on the west side and the middle beam on the north which was held in position by an elaborate arrangement of timbers. Several additional dressed beams were observed, but few seemed to be in their original positions.

Reconstruction of Basal Framework. —I have said that the structure of the

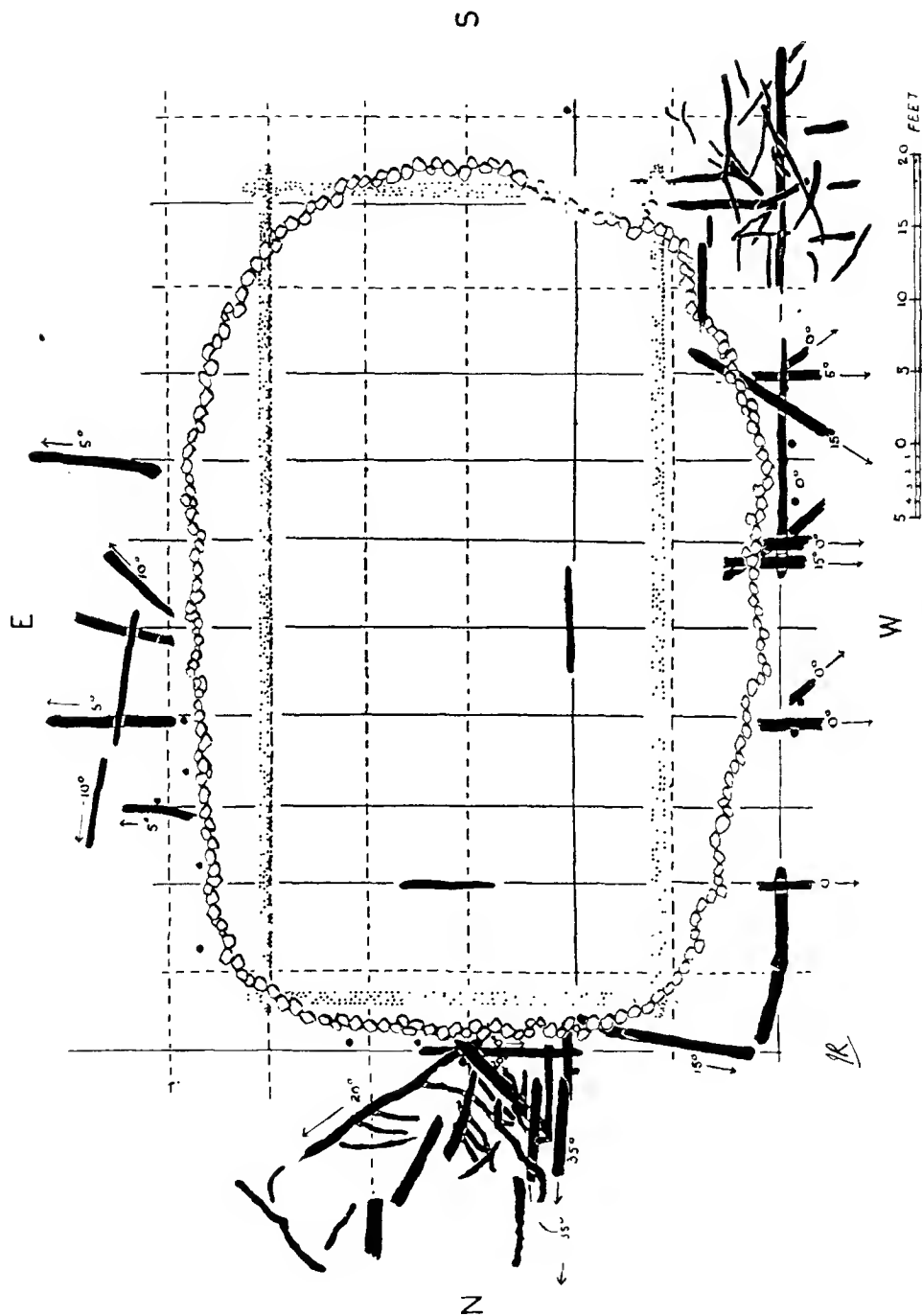


Fig. 15. Basal timber construction. The outer limit of the stone-work of the caanog and the position of the upper platform are indicated. Beams and posts revealed by excavation are shown in solid black. A reconstruction of the basal framework is indicated by unbroken lines, and where it is more doubtful, by broken lines.

original basal framework, because of its condition, has been more difficult to visualise than any other part of this remarkable island. Two sets of facts help towards a reconstruction, the most important being the position of such squared beams as survived or at any rate were discovered. A second indication is given by the positions of the upright posts, which, it may be safely assumed, were placed at intersections of beams to prevent their lateral movement. It must be remembered, however, that these positions, as fixed by measurement from base-lines during the preliminary survey, do not necessarily mark the exact angle of an intersection, for the survey, made before excavation was begun, could only mark the position of the projecting tip of a post. Since it was found later that in some cases pressure of the load of the island had moved a post from its upright position (see Pl. XII. 2), its bearing against the underground beams might well be a foot or even more from the point of its emergence at the surface.

In the case of the cross-beams, distances of 12 feet on the west, and 6 and 12 feet on the east, together with the fact that one beam had its fellow on the opposite side and that squared timbers were found at the same level within the island, suggested that the lines of the beams discovered should be continued from side to side. These definite lines are indicated by single unbroken lines in the reconstruction in fig. 15, and give a framework with six-foot spacing of cross-beams. The six-foot spacing has been continued (indicated by a broken line) where beams were not discovered, but it will be seen that, except in one case, the positions of upright posts tend to confirm the symmetrical arrangement.

As for the longitudinal beams their position must be regarded as uncertain. The evidence I have used in suggesting approximate positions, indicated by broken lines, in the reconstruction are: first, the definite position of the outer longitudinal series on the west side; second, the occurrence in the centre of the island of angled timber at the level of the basal framework lying parallel with and under the longitudinal beam of the upper platform second from the west side; third, the importance of a strongly fortified point at the centre of the north side (described below), which suggests that it was a key position of the framework; fourth, the indications given by the upright posts and by certain squared timbers at the north end, although few of these seemed to have remained exactly in their original positions. These indications point to the probability that the longitudinal timbers were spaced at distances of 7 feet, as were those of the upper platform, and accordingly they have been so shown, hypothetically, in the reconstruction. The basal framework covered an area approximately 65 feet in length and 42 feet in breadth.

The Level of the Basal Framework and its Foundation.—The basal platform as examined, judging by reference to the surveyed points, was not level, but tilted from east to west and slightly from north to south, the

levels being approximately 775 O.D. on the east, where it was highest, 774 O.D. on the north, 773 O.D. on the south, and 772 O.D. on the west. In the centre of the island the level of the timbers was also about 772 O.D.

But the levels bring out another point of interest in the construction of the island. The levels of the basal framework are *below* what was the original surface of the bed of the loch, according to the indications of the surveyed contours in the neighbourhood of the island. There are three possibilities—that the bed in the neighbourhood of the island had silted up since the island was built, or that the island had itself sunk into the bed of sand and vegetable debris, or that the site of the island was excavated by the builders before the foundation was laid.

That some silting had taken place is shown by the layers of sand without stones which covered the basal framework to a depth of up to 18 inches and lay upon the lower slopes of the island. This if anything was an advantage since it would protect the timbers from scouring by currents in the loch.

The danger of the subsidence of the timber foundations was foreseen by the builders, and they endeavoured to counter it in two ways. The basal framework on the outskirts of the island was bedded upon a layer of brushwood, much decayed, which rested upon the bed of the loch. But within the island, over an area upon which the pressure of the upper structures would be greatest, and which did not extend to the limits of the upper platform, at any rate on the north side, the basal timbers were laid upon a foundation of large closely packed stones. No brushwood was seen amongst these (see figs. 13 and 14).

It may be assumed that the foundation framework when laid was level. The presence, therefore, of a stone foundation over 1 foot in depth to carry beams which, outside the limits of the stone, rested upon the sand but for a thin layer of brushwood means either that the stones were laid in a natural hollow in the bed of the loch, or that a hollow was excavated for them. I have no doubt that the latter explanation is the correct one, and that since a levelling of the bed of the loch was bound to be necessary to accommodate a foundation 65 feet long by 42 feet broad, the requisite adjustments were made during that process.

The use of a stone foundation at Loch Treig bears some analogy to, though it is not identical with, the cases referred to by Keller (1866, p. 4) in which elevations of stones were made on the bottom of certain lakes, as at Nidau, as the bases of pile-dwellings.

Methods of Strengthening the Structures. Shoring Beams. - In addition to the horizontal beams set at right angles to each other on the west side there were two which were inclined upwards within the surface of the slope of the island at angles of about 15° with the horizontal, and one at 10° on the east side. These were probably shoring timbers bearing against the

posts of the upper platform, or directly against the beams of the platform itself, though the connection no longer existed. The decay and disappearance of the outer details of the woodwork make it difficult to imagine the original construction, but there were several loose timbers 7 to 8 feet long lying up and down the slope and several more scattered on the bed of the loch in the neighbourhood of the island. These had been rather superficial structures which had been the first to be washed out as the island deteriorated, and I suspect that they represented the remains of a system of shoring, designed to support the posts fixing the upper platform or even the outer beams of that platform itself as is indicated by the deep notch in the cross-beam shown in Pl. VII. 3.

Timber Lattices.—A second strengthening method, of a type which has been found in the groundwork of many crannogs, was the reinforcement of the outlying foundations by an irregular lattice-work of birch branches. These were of all sorts of lengths and diameters, sometimes straight, more often crooked, and they were laid down without any regular arrangement except that they crossed each other to form lattices. The purpose of these was to prevent erosion of the soil by the action of currents at critical points of the basal structure.

In the case of our island they were concentrated in two areas: along the south side, which was scoured by the flow from Loch Treig in spate, and particularly at the south-west corner where at all times there must have been danger of erosion from the Treig outflow (fig. 15 and Pl. X. 2). The second reinforced area lay on the north side. This was in the lee of the island, and it was protected not only by a lattice of birch branches and trunks (fig. 15 and Pl. XI), but its woodwork was reinforced by an elaborate arrangement of bearing-posts, referred to in the following paragraph.

A Key-point and its Construction.—It is remarkable that the most carefully strengthened part of the woodwork outside the island should have been at the north end, on the lee side of the island, where it could not have been subjected to direct currents from Loch Treig such as beat upon the southern and western sides. And since it is hardly conceivable that the eddies and suction of a tail current would demand such reinforcements, their purpose must be looked for in another direction.

This purpose was to form a series of barriers which would resist the outward pressure of the mass of the island and so prevent its subsidence. Why such precautions should have been taken only at the north side seems to have been due partly to the special facilities offered by the height of the bed of the loch at this part, but mainly to the fact that here was the place of access to the island with the consequent wear and tear and pressure of traffic and the risk of collapse of the island structures.

The key structure in the system designed to resist the outward thrust of the island was erected at the centre of the north side. Here the central

cross-beam of the outer framework, corresponding to the basal framework on the west side but at a higher level, was held down by two heavy timbers set at a wide angle to each other and overlapping above the horizontal beam. One was a dressed and squared beam, the other a natural birch trunk, and the outer ends of both dipped into the silt at an angle of 20° , so that they were firmly embedded. Additional strength was given to the structure by carefully designed wedging: a stout upright post in the angle took the main backward pressure, and a set of small wedges of squared oak fitting in checks in the sides of the timbers, and of uprights of natural birch fixed them in position. The construction of this key-point gave so

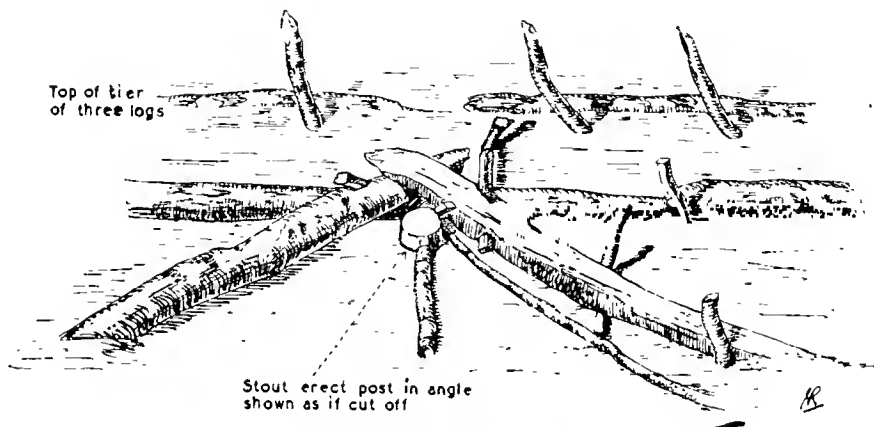


Fig. 16. Key-point of crossed and wedged timbers on bed of loch at north end of crannog (cf. Pl. XI, 2, and Pl. XII, 1).

excellent an idea of the wedging technique of the island builders that I have shown it in Pl. XI, 2 and Pl. XII, 1, and somewhat more diagrammatically in fig. 16.

Beyond this key-point the slightly sloping bed of the loch was fortified by a lattice of birch trunks and branches, amongst which were occasional squared timbers which may have been displaced members of the regular basal framework (see fig. 15).

Between the key-point and the island the construction was more significant. The key-point itself lay less than 2 feet below the level of the outer beam of the upper platform, beneath which the bed of the loch was at a depth of nearly 5 feet. So that a steep slope descending 3 feet in the intervening space of 4 feet appears to have been excavated to take the main outward thrust of the island mass.

Further to break the force of this thrust a range of three superimposed birch trunks was placed midway down the slope. This was similar to the tiers of the intermediate timbers within the island of which it might be regarded as a continuation, except that it had on its outer side a series

of upright posts of birch trunks supporting it against the outward push. The intensity of the pressure and the need for special precautions in this area is shown by the angles at which these posts have been forced outward from the perpendicular (see Pl. XII. 2). A firm packing of stones and earth embedded and held in place all these structures.

The combined effect of these devices for checking the lateral thrust of the island will be appreciated by a glance at fig. 17. But additional support was given by the introduction of heavy baulks of dressed

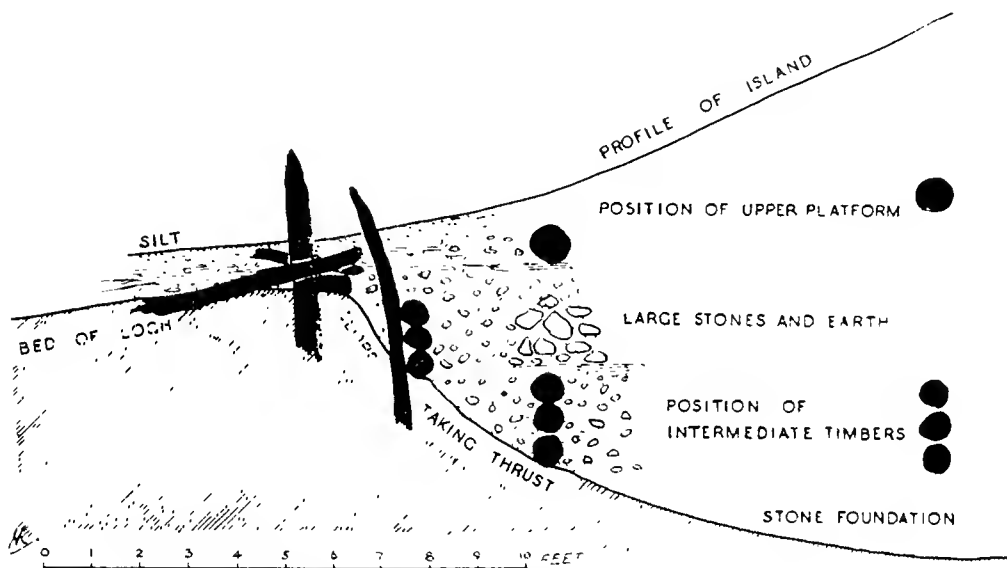


Fig. 17. Vertical section (N-S) at boundary of crannog on north side, showing devices thought to be for withstanding the lateral thrust of the mass of the crannog.

timber, two of which, rising at an angle of 15° , are shown in Pl. XIII. 1. They resembled the timbers of the regular basal framework, of which they probably formed part.

(ix) *The Stone Covering or Breakwater.*

As the general description and the illustrations of the undisturbed island show, the internal structures were concealed beneath a great accumulation of stones which covered and protected all the woodwork except the outer extensions of the basal framework, which were buried in sand and silt. The stones, roughly graded in increasing size from the top to the bottom of the slope, had at first probably assumed the regular and natural angle of such material deposited in air at random, that is an angle of about 35° , for there was no sign of an attempt at building, in the

sense in which a dry-stone dyke is built. But the influences of time and the currents had destroyed the original symmetry and produced the various less marked slopes which I have described in discussing the sectional drawings (p. 22).

Whether the grading in size of the stones was deliberate or was due to the sorting action of the water cannot now be decided, although I suspect that it may have been part of the design. But at any rate it cannot be doubted that the stone covering as a whole was a deliberate and well-conceived plan for protecting the essential timber structures of the island, and for acting as a breakwater which would take the force of the currents, and save not only the timbers, but the earth, stone, and brushwood components which supported them, from gradual dispersal and destruction. That the structure of the island had survived its immersion through many centuries was a tribute to the efficiency of the stone breakwater.

(x) *The Landing-place.*

Many of the Scottish crannogs were connected with the shore by a wooden gangway or by stepping-stones, both probably submerged, so that the way of entry was a secret of the inhabitants and their friends. The same idea is suggested in Diarmad's reference to the stepping-stones at Loch Treig, but as I have pointed out these had another purpose and in any case did not lead to the island.

In view, however, of the frequency with which gangways have been found at other crannogs I had trenches excavated along and across the ridge to the north of the island, the only place where a gangway to the shore could have been constructed. No trace was found of any arrangement of timber which could have been the supporting framework of a gangway, and the few branches of birch lying horizontally in the silt had the casual appearance of drift-wood.

Since there was apparently no gangway from the shore, access to the island must have been solely by boat, and that implies a landing-place and some means of reaching the top of the island without climbing its stony sides, for these would have suffered under constant traffic. We were fortunate in finding this landing-place.

At the north end of the island, at the bottom of the stone slope and about one-third of the distance along the upper platform from the western corner, were two heavy beams embedded in the bed of the loch at a relatively high angle. At other parts of the island beams were found set at angles to the horizontal, but these angles never exceeded 15° , except in the case of the heavy bearing-beams at the key-point, where the angle was 20° . The beams now to be described projected from the bed of the loch, sloping upwards towards the island at an angle of 35° . It is probably significant that the angle of repose assumed by the sides of a heap of gravel "in the dry" is

30° to 40° (Dean, 1935, p. 210). For a structure submerged in water the angle of stability would be less (26° to 34°), but the stone face of the island above water-level must originally have been at about 35°. The sloping beams, the upper formerly exposed parts of which had decayed away, would therefore if produced have run up parallel with the exposed slope of the island. Their relationship to the slope of the submerged part of the north side is shown in a photograph (Pl. XIII, 2) taken during an early stage in the excavations.

The beams themselves were stout and squared, 6 feet long by 9 inches deep and 6 inches broad, set parallel to each other at a distance of 1 foot, with the narrow surface upwards. Their appearance suggested the side-bars of a ladder, and this was their true function, for close examination showed the presence of shaped dook holes for receiving the steps. Three of these may be seen on the inner side of the remote side-bar in the photograph (Pl. XIII, 2) at distances of about 1 foot apart, the middle one being difficult to distinguish because it is plugged by the wood of the broken step. It will be seen that the steps were shaped and placed in position so that the "tread" of the step was the broadest part and was horizontal.

It may be taken therefore that the island was landed on by means of a fixed ladder, which lay parallel to the exposed stone slope and the head of which was probably connected with the dwelling surface by a short horizontal gangway (see Reconstruction, Pl. XIX).

A relic of such an arrangement is suggested by Munro's description of the crannog at Lochan Dughaill, in Argyllshire, where "leading outwards from this [a supposed doorway] were six or seven round beams laid parallel to this [the door-step] and kept in position by a couple of beams running along their ends . . . an arrangement which undoubtedly served as a causeway of some kind leading to the water's-edge" (1893, p. 216). Of course this horizontal causeway would not lead to the "water's-edge," because that would mean that the dwelling surface was at water-level, but it led to the edge of the raised dwelling surface, and probably there connected with a gangway and ladder.

The boat which conveyed the inhabitants must have been moored in the neighbourhood of the landing-place, and it is likely that the post shown close to the ladder in the photograph (Pl. XIII, 2) was the mooring-post. The upper part had the appearance of having been worn as by a rope, but this appearance may have been due to differential weathering of the part exposed in air as contrasted with the submerged portion.

8. THE BUILDING OF THE LAKE-DWELLING.

From the foregoing description it will be seen that the Loch Treig lake-dwelling was a definitely planned structure of an elaborate kind, very

different from the true pile-dwellings of Europe. Keller suggested that the Scottish and Irish crannogs bore "a great analogy with the fascine dwellings of Switzerland" (1866, p. 6), but the succession of distinctive layers is much more elaborate than the simple brushwood body of a fascine island, and indeed it is more elaborate than any of the continental types.

Artificial islands of the type of Loch Treig must be regarded as highly specialised structures peculiar to our area, combining some of the features of continental types with new developments which contributed to the stability and the permanence of these habitations. Unfortunately it is impossible to say how far the island I have described is typical of the Scottish or Irish crannogs, for few in either country have been described in detail, and from the Scottish sites most thoroughly described, those in the south of Scotland investigated by Dr Robert Munro and others, there are differences in detail as marked as the features common to both.

From his knowledge of Scottish crannogs Dr Munro laid down very precisely the successive stages in the building of such erections (1882, p. 262), but his interpretation in some respects does not agree with the appearances at Loch Treig. I shall, therefore, indicate here the methods by which the builders appear to have overcome the difficulties which faced them in this particular case, although it may be that all of these conclusions are not applicable to other artificial islands, where conditions may have been different.

The succession of the layers of the Loch Treig island, at the part where it was best preserved, may be summarised as follows:—

	Feet.	Inches.
Stone and earth super-structure, containing successive hearths or settlement levels . . .	3	3
<i>Brushwood layer</i> . . . . .	.	3
UPPER PLATFORM	1	6
<i>Heather and bracken layer</i> . . . . .	.	3
Small stones and earth . . . . .	.	9
<i>Layers of broken birch branches</i> . . . . .	.	3
Large stones and earth	1	9
<i>Brushwood layer</i> . . . . .	..	2
INTERMEDIATE TIMBERS and <i>brushwood</i>	2	.
<i>Brushwood layer</i> . . . . .	.	6
BASAL TIMBERS . . . . .	.	8
Foundation of large stones and a little earth ¹	1	.
Bed of loch . . . . .	..	..
Total depth of structures	12	4

The first business of the island builders was to make a foundation upon which the basal timbers might rest. This involved the general levelling

¹ Beyond the area of this foundation the basal timbers lay upon a layer of brushwood which rested upon the bed of the loch.

or smoothing of the bottom of the loch and the scooping out of a hollow in the central area of the island to receive the foundation layer of stones, so that the *upper surface* of the stone layer coincided with the bed of the loch, over which the basal timbers were continued. Since the foundations are at a level varying from 772 to 775 O.D., and the original level of the loch was probably at about 781 feet O.D., 2 feet below the modern level, the foundations would appear to have been laid in a depth of from 6 to 9 feet of water.

The first great problem, then, is—how did the builders work at such a depth? I must confess that I think it impossible that they could have done so, and from this and other difficulties which shall be referred to in due course, I have been forced to the conclusion that they did not build the island in relatively deep water, but employed a device to enable them to work, as engineers express it, “in the dry.”

In order to overcome the difficulty of explaining a foundation laid in several feet of water, Dr Munro stated (1882, p. 262) that “immediately over the chosen site a circular raft of trunks of trees, laid above branches and brushwood, was formed, and above it additional layers of logs, together with stones, gravel, etc., were heaped up till the whole mass grounded.” Applied to the Treig crannog the suggestion involves difficulties almost as great as working at a depth.

The basal “raft” in the case of Loch Treig was some 65 feet long by 42 feet broad. It was formed mainly of squared beams at distances not less than 6 feet apart, a very open framework, rather loosely fitted together. If such a raft was constructed over the site chosen, as Dr Munro says, then the men who built it were standing in water from 6 to 9 feet in depth or were working from boats. How did they keep this enormous mass of timber from drifting in the currents of Eadarloch as they worked, or how, even if they were successful in piling up logs and stones upon the open framework, could they have induced it to sink, when the moment it was submerged the logs above would have floated, unless they too were held down by more stones and earth? And could the open framework have borne the enormous weight of the masses above it without disrupting? When it is recalled that in our island the stone and earth covering did not extend to the outer timbers of the basal framework, it is clear that so great weight concentrated upon the centre must have crashed through the loosely-knit frame.

At each stage of the construction we are faced with the same difficulty. Can we imagine that logs of the intermediate timbers were piled in tiers three on top of each other, at regular distances, and the whole packed with earth and small stones *under* water as deep as a man? The intermediate timbers had a volume of about 1180 cubic feet, and taking the weight of a cubic foot of water at 62·5 lb. and the weight of the wood at 42 lb. a cubic

foot, the buoyancy of the wood in water would be 20·5 lb. a cubic foot: in other words, it would have required about $10\frac{3}{4}$ tons of stones and earth to keep the intermediate timbers down, and this weight would have to be placed above and not between the tiers.

So also with the upper platform: it would have offered a somewhat easier problem because it was much nearer the surface of the loch when the island was completed. Nevertheless to build in position and sink in, say, 2 feet of water a structure weighing considerably over 13 tons, which required more than 6 tons of stones and earth to put it under, which was not built with very great rigidity and the superficial floor of which consisted of loose logs, would have been a serious engineering feat.

I have said nothing about the layers of brushwood which underlay each of the timber constructions, but if the timbers were sunk as Dr Munro suggested, then also layers of brushwood covering an area of more than 30 by 50 feet must have been arranged on the water and sunk before or perhaps, in the case of the upper platform, with the timbers.

Another suggestion which has been made is that the timber structures were assembled on or near the shore and floated to their proper position, where they were then sunk. The suggestion does not meet the difficulty about sinking the loosely constructed frameworks, and does not affect the intermediate timbers, which were not joined together, and must have been placed singly. But it involves a further difficulty—namely the launching of, for example, the completed upper platform, a framework 57 feet long by 42 feet broad which was not rigidly constructed, and which must have weighed about 13 tons in air: and this, considering the structure of the platform, would present an insurmountable problem.

I am driven to the conclusion that this lake-dwelling at any rate was not formed by the sinking of already prepared wooden rafts, after the manner suggested by Dr Munro, but that it was built "in the dry," and the method I conceive to have been as follows.

The level of the water in Eadarloch was determined in the first place by the level of the outflow at River Treig, and that was between 780 and 781 feet above sea-level (O.D.), and in the second place by the amount of water flowing into Eadarloch from Loch Treig. In normal conditions the Loch Treig flow accounted for a depth of 2 or 3 feet over the sand-bar separating Eadarloch from River Treig, but in very dry summers this flow almost ceased, so that the level of Eadarloch was reduced to the level of the sand-bar, about 781 feet (O.D.).

My suggestion is that the island builders deliberately lowered the level of Eadarloch by cutting the sand-bar, so that the loch drained into River Treig sufficiently to expose or almost to expose the mound on which the island was constructed. Presumably they would choose the most favourable conditions for such an engineering feat, that is a very dry summer, and in

such conditions a lowering of the sand-bar by some six or seven feet would have enabled them to build the island "in the dry."

Subsequently they would have reconstructed the sand-bar, causing the water to rise to the required level, as beavers form obstructions to dam up the water about their huts. But our island builders were skilled engineers, and the evidence suggests that they did not complete the island and then in one effort subsequently complete the dam, but that, instead, the reconstruction of the dam proceeded step by step with the construction of the island, so that the water rose as the island rose stage by stage from its foundations.

The advantages of such a gradual restoration of the water-level are obvious. Hundreds of tons of stones, soil, and timber had to be conveyed from the shore and placed in position, and the raising of the waters almost to the level at which work was proceeding would enable logs to be floated and stones and soil to be transported close to the places where they were to be laid. The means by which the transportation was carried out are referred to in the subsequent section dealing with the objects found in the loch.

The evidences which support the suggestion of the concurrent raising of the waters and the island are, first, the presence of large boulders resting upon the tiers of the intermediate timbers. The great difficulty of transporting these boulders from the shore indicates that they had some very special purpose, namely, to prevent the trunks from floating. But they would not have been necessary had the whole weighty superstructure of the island been in position before the water was raised to its ultimate level: on the other hand, they would have been necessary if the water-level was raised as the work proceeded, for in that case the intermediate timbers would have had to be held in position while the superstructures were being floated into position above them. The second evidence is circumstantial: it is difficult to conceive how some of the enormous tree-trunks which were used, some of them 20 and 21 inches in diameter, could have been placed in position unless they were floated close to their site, or how the trunks of the upper platform, most of which would have taken six men to carry them, could have been borne some 6 or 7 feet up the sides of a rubble-constructed island without damaging its surface. Such difficulties would not arise if the water-level was raised as the building proceeded.

The Use of Brushwood in the Structure.

The use of brushwood in the construction of crannogs deserves more notice than it has received. Apart from its dominant use in the fascine lake-dwellings of Europe, where it formed the entire foundation of the dwelling platform, its rôle has generally been regarded as of very restricted

significance, namely, to prevent the sinking of the foundations in the layers of peat upon which most crannogs were built. Thus at Glastonbury Lake Village layers of brushwood up to 2 feet in thickness lay beneath the hut-mounds and upon the peat, and the clay floors were placed upon the brushwood. Dr Munro's summary of the structure of Scottish crannogs mentions brushwood only as intervening between the basal timbers and "an unfathomable quagmire" (1882, p. 262), although his descriptions of several suggest that brushwood layers occurred elsewhere than under the foundations. For example, at Kilbirnie in Ayrshire a six-inch much compressed layer lay between 18 inches to 2 feet of gravel and the underlying construction of timber (1882, p. 64), and at Lochlee a thin layer of brushwood lay between the superficial log pavement and the massive system of tree-trunks which supported it (1882, p. 97).

The investigation of the Loch Treig island, however, brings new meaning to the latter observations, for it shows that brushwood layers played quite an important part in the technique of the island builders. In our island there were seven distinct layers of vegetable matter used in construction, that is omitting the organic deposits which indicated different settlement levels in the stone-and-earth superstructure and which had no constructional significance (see table of layers, p. 48 and fig. 13). An analysis of the positions of these layers with reference to the materials below and above them will help to indicate their purpose. Three layers of brushwood rested upon timber constructions, two upon stone-and-earth material, and one upon the sand deposits of the loch. On the other hand, there lay upon the brushwood layers three timber constructions and three deposits of stones and earth. The seventh layer formed a packing between the tree-trunks of the intermediate timbers and thus had timbers both above and below it. This summary makes it clear that the brushwood was not associated with any particular layer either above it or below it: its purpose, therefore, must have been of some general nature.

Indeed a glance at the table referred to above shows that, as a general rule, wherever two layers of different sorts of material followed one another, they were separated by brushwood. The only exception was the basal foundation of large stones, below which no brushwood lay and upon which the basal timbers rested directly.

One purpose of the brushwood undoubtedly was to distribute the pressure of the structures resting upon it, so that they would not sink irregularly into the underlying layer and destroy the level, for example where the basal timbers were separated from the sand of the loch bottom, or in the case of other crannogs where the substratum was soft peat. But that purpose would scarcely apply to a timber framework resting upon packed stones and earth. A more general and probably the primary purpose of the brushwood layers was to form a soft bed into which the

structures above, whether timber or stones and earth, sank slightly, so that they were retained in exact position and prevented from side-slipping. The brushwood acted as a sort of primitive mortar locking the various structures of the island in place.

This would explain why no brushwood was found below the large and angular stones which formed the foundation of the island, or between them and the basal timbers: for the stones became fixed in position by embedding themselves in the sand, and the basal timbers which rested upon these large stones similarly could be entrenched and locked amongst the angular faces.

It was noticeable that various grades of this brushwood "mortar" were used for different purposes. Where the carefully designed and constructed upper platform followed above a layer of small stones and earth there intervened a fine textured layer of heather and bracken, and the same materials were inserted between the trunks in each of the intermediate tiers. The rougher timbers of the intermediate tiers, and the stone-and-earth layer above them, rested upon rougher brushwood, mainly bundles of stout heather stems (Pl. XVI. 3). And where two successive layers of stones and earth occurred, the upper with smaller and the lower with larger stones, the intervening brushwood was formed of birch branches about $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter, with little admixture of finer material.

The Question of a Defensive Stockade.

It is characteristic of the lake-dwellings of the British Isles that they are surrounded by upright piles. E. Dumbleton, quoted by Keller (1866, p. 660) refers to a "crannoge, or stockaded island, in Llangorse Lake, near Brecon (South Wales)." Keller himself summarises the information relating to the piles of Irish and Scottish crannogs thus: "They are surrounded by a stockade of piles, driven into the bed of the lake, so as to enclose a circle or an oval. . . . These piles are usually in a single row, but sometimes the rows are double or even treble. Occasionally the piles are boards not round stems" (1866, p. 6). Munro, stating the position at a later date, says of Scottish lake-dwellings: "All these accounts, as well as the more recent notices of crannogs, are characterised by two prominent structural features, viz. (1) upright piles in the form of one or more circles: and (2) the remains of flat beams containing large square-cut holes at their extremities" (1882, p. 260).

There has been a strong tendency to look upon the ring or rings of piles as stockades in the military sense, defence works behind which the inhabitants could shelter from enemies. Wakeman expressed that point of view very definitely: "the Irish crannog, great or small, was simply an island, either altogether or in part artificial, strongly staked with piles

of oak, pine, yew, alder, or other timber, encompassed by rows of palisading (the bases of which usually remain), behind which the occupiers of the hold might defend themselves with advantage against assailants" (1873, p. 305). And the placing of emphasis upon the stockade led to the view, held for example by Dr Stuart, who first published comprehensive descriptions of Scottish crannogs in the *Proceedings of the Society of Antiquaries of Scotland* (1868, p. 114), that the purpose of the mortised beams was to keep the piles which formed the stockade firmly in position. It was Munro, following upon his excavations at Buston, near Kilmaurs in Ayrshire, who, although he still wrote of the uprights being "linked together by horizontal beams having square-cut holes" (1882, p. 107), realised that "the main object of the whole of this elaborate structural system was to give stability to the island, afford fixed points on its surface, and prevent the superincumbent pressure of whatever buildings may have been erected over it from causing the general mass to bulge outwards" (1882, p. 198).

Professor Childe accurately sums up the position as it has been surmised hitherto: "The pavement was surrounded by two or three rings of stout oak piles. The piles were joined together by oak beams, mortised into one another and into the piles. The rings of piles, thus elaborately clamped together, may have helped to give stability to the island and to diminish erosion by waves, but they served primarily as the basis for a stockade surrounding the central platform" (1935, p. 211).

The Loch Treig island throws some light on the purpose of piles. It was surrounded by the customary two rows of stakes, of which the inner at any rate was double. Instead, however, of forming circles or ovals, the rows formed a rectangle, following the outlines of the wooden frameworks. The primary purpose of these uprights is clear: they were placed in the angles of intersection of the beams of the frameworks to fix the framework and prevent lateral movement, and the presence of a double row, the stakes of which were 1-2 feet apart, was due to the fact that the piles were placed in diagonally opposite angles. But had they a second, defensive purpose? To have reached the surface of the water, *without projecting above it*, the stakes of the outer series would have measured 5 to 9 feet high from the ground; even a slight pressure upon the upper end of such a stake, a birch stem 5 or 6 inches in diameter, would, owing to the leverage, have tended to break or dislodge it, and thus would destroy its first purpose of anchoring the basal framework. The outer series of stakes, therefore, can scarcely have been intended to form a defensive stockade.

The inner series, rising from the middle of the stone slopes, would have reached the surface of the water had they projected 2 feet from the stones, and their ends would have been *level with the surface of the island* had they projected about 4 feet 6 inches from the stones. It is not

likely that they formed any sort of breastwork, for this would have required additional length and such a breastwork would have been 5 or 6 feet away from the edge of the inhabited surface. But they may have formed a sort of palisade, projecting 2 or 3 feet from the water at a distance of 3 feet from the stone slope, which would have prevented the running of a boat against the side of the island (see Reconstruction, Pl. XIX).

If the island had any wooden breastwork protecting the dwellings, as some of the more elaborate crannogs of south-western Scotland seem to have had, it must have been erected around the margin of the levelled surface; no trace of such a structure was found.

9. RELICS FOUND AT THE LAKE-DWELLING.

Although careful watch was kept during the excavations, the collection of relics turned out to be a meagre one. Special search was made on the island and in its vicinity for a kitchen-midden, but no trace of any accumulation of food or other remains was found, and I surmise that food refuse was cast into the waters and was swept away by the currents. The scarcity of relics suggests that the inhabitants of the lake-dwelling had few possessions, and the nature of such as were found also points to poverty and absence of material resources. Nevertheless some are of special interest.

I have grouped the objects roughly according to whether they were wooden objects associated with the construction of the lake-dwelling, were metal tools and weapons, were for domestic use, or were personal relics.

(a) *Wooden Objects associated with the Construction of the Lake-dwelling.*

Dowel-pins and Pegs.—Several dowel-pins and pegs were found, generally about the level of the upper platform. They varied considerably in size and character. The most primitive was a much-weathered length of natural birch branch still with bark upon it, cut to make a rather irregular pin, 8 inches long by $1\frac{1}{2}$ inch in diameter (Pl. XIV. 1. *a*). Almost equally simple was a stout pin merely cut from a natural branch, unshaped except for the flat ends and the cutting of the branches roughly level with the surface (Pl. XIV. 1. *b*). It was a uniform cylinder 9 inches long by about 2 inches in diameter, and although it was not found in position its diameter agrees with that of some of the larger burnt-out holes at the interlocking square checks in the upper platform.

Of more skilful construction was the surviving portion of a dowel-pin extracted, with some difficulty, from a hole penetrating the centre of a square check in a longitudinal beam of the upper platform. It had been

abraded flush with the surfaces of the beam so that its length of $5\frac{1}{2}$ inches represents the distance from the outer surface of the trunk to the inner face of the check. The pin was of oak uniformly thick, eight-sided, with four larger faces, and four smaller faces which alternated with them, and it measured about $1\frac{1}{4}$ inch from face to face (Pl. XIV, 1 *d*). A pin of similar eight-sided design which had not been used, but the point of which showed signs of charring, was 9 inches long and about 1 inch thick. The head end was cut at a slant and an appearance of tapering at the lower end was probably due to partial destruction by fire and decay (Pl. XIV, 1, *c*). The constructional value of this eight-sided type of dowel-pin has already been referred to (p. 32).

It is not surprising that a submerged framework should have been fixed together by wooden pins, for they would withstand decay better than iron: but it is remarkable that throughout the island so little trace of iron nails was found. This may have been due to corrosion, but it permits the interpretation that the builders were more adept at wooden construction, and that their habitation, as well as the submerged frameworks, was almost entirely put together of wood.

A purpose different from that of the dowel-pins was served by a stout peg of oak, with a crudely shaped head which projected beyond the line of the stem at one side only. It was 12 inches long and $1\frac{1}{2}$ by $1\frac{1}{4}$ inch thick, bevelled at the tip to form a chisel-shaped end (Pl. XIV, 1, *e*). The peg was not found in position, but it may be surmised from its shape and its presence near the upper platform that it was used to peg down the underlying brushwood layer while the platform was being laid.

A peg of similar size and shape was found at the cranuog at Kilnamaddo, in Co. Fermanagh, Ireland, and is said to have been used "probably to secure the lower logs in position" (Wood-Martin, 1886, p. 192, and pl. xlv, 7), but at Loch Treig the dowel-pins were driven flush with the surface of the timbers they pierced, and the "headed pin" was obviously devised for some other purpose, namely, holding down brushwood.

Oak Club.—An interesting relic, which gives a clue to the method of the builders, was a heavy oak club of squared timber (fig. 18). Lozenge-shaped in section, $26\frac{3}{4}$ inches long, $2\frac{1}{2}$ inches deep by $2\frac{1}{4}$ wide, edge to edge, at the handle, the club gradually increased in size to the head, which at its deepest was $3\frac{3}{4}$ inches. The lower surface of the head curved upwards like the prow of a boat. At the striking surface, indicated by hollows due to abrasion, the edge had been trimmed away to give a flat surface 1 inch across. The size of this surface and of the abraded hollows upon it makes it certain that the club was used for driving home the dowel-pins used in the construction of the framework, and force was given to the blow by the lozenge shape of the club which resulted in the greatest depth of oak being directly behind the striking surface.

In general appearance the club bears some resemblance to a wooden object described as a "wooden spoon-like implement" found at the crannog at Barhapple Loch in Wigtownshire, except that the latter has a shaped handle: its size unfortunately is not indicated (Munro, 1885, p. 121, fig. 42).

Boat-like Relics.—Two somewhat puzzling objects of oak, which have been regarded as boats, were found in the vicinity of the island. Both had been washed from the deposits in which they had been preserved so that their original positions are unknown, but their association with the inhabitants of the island is a matter of reasonable conjecture.

The first was found washed up on the western shore of the Eadarloch by workmen engaged in the early operations there. Not realising the

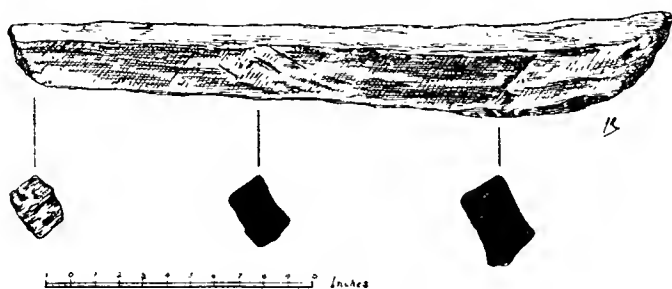


Fig. 18. Club of oak used for driving wooden dowel-pins into their sockets; three cross-sections are shown.

interest of their discovery, they placed stones in it for ballast and set it adrift on the waters. Shortly afterwards it was found again, grounded upon the eastern shore, by Mr Duncan Robertson, Head Keeper at Corrour, who appreciating its interest took it to the proprietor, Sir John Stirling-Maxwell, by whom it was presented to the West Highland Museum in Fort William. The accompanying photographs (Pl. XV, 1, 2) were made there by Dr A. E. Ritchie and myself in April 1911, thanks to the permission and assistance of the Curator, Miss MacAndrew. The vessel has been "dug-out" of a solid trunk of oak, the marks of the adze being still visible on some parts of it. It is canoe-shaped, except that the ends are square instead of pointed and that the upper surface is continued at the ends in solid, horizontal, lug-like projections 3 inches deep at one end, 2 inches at the other. The sides, which terminate in a sharp edge, are slightly bulging, the bottom flat, rounding gently into the sides, and the square ends slope slightly inwards to the bottom. The thickness of the wood varies from $1\frac{3}{4}$ to 2 inches at the sides, and is slightly thicker at the bottom. The dimensions of this problematical object are: length over all, 5 feet 5 inches; depth from edge to under-surface of bottom, $9\frac{3}{4}$ inches; breadth varies from $9\frac{3}{4}$ to $10\frac{1}{4}$ inches; the length of the cavity is 4 feet 5 inches, its depth $6\frac{1}{4}$ inches; other measurements are given in Pl. XVI, 1, 2.

The likelihood is that this vessel was associated with the island: its workmanship is primitive, and at the north end of the island near the place of access and beside the brushwood layer below the upper platform were found many oak-chips cut by an adze (Pl. XIV. 2. *a* and *b*), which must have been derived from this or a similar object, for no other oak dressed in the same manner was found in the structure of the island itself. Its purpose is not so easy to fathom. It is too small to have been used as a boat by an adult, but the suggestion has been made that it may have been a boy's canoe. Another suggestion is that it may have been used as a trough which contained food, and which was carried by means of the lugs at the end. In this connection its resemblance to the wooden dug-out trough found at the crannog at Lochlee is striking (see Munro, 1882, fig. 44, p. 93), but that vessel was less than 2 feet long, and its shallow cavity had a length of only about 1 foot 3 inches. Similarity in design, where the sizes are so different, need not indicate similar purposes. Indeed the design is repeated in an undoubted canoe "hollowed out of a single piece of oak" found at Toome Bar in Ireland, but that canoe was much larger than the Treig vessel—"the length fifteen feet, with projecting beaks at prow and stern; it is twenty inches wide, fourteen inches deep, and is flat-bottomed." The illustration shows that it had two thwarts (Wood-Martin, 1886, p. 49, pl. iv. 3).

My suggestion is that the vessel may have been a cargo vessel made for floating materials from the shore, such as the vast quantities of earth and small stones required in the construction of the crannog and for its upkeep afterwards. In the early stages of construction the builders would be able to wade from the shore, and in the later stages when the water-level was artificially raised, as I have suggested, they would have to swim, but in either case the lugs at the end of the vessel would serve conveniently for pulling and pushing. Moreover, the bottom of the boat has the appearance of having been smoothed by friction, so that it may often have been loaded up and dragged over soil or shingle before it reached the water. In this respect it has a close analogue in the Irish dug-out, trough-shaped "portable canoe," 8 to 12 feet long, square at both ends, round in the bottom, and having projecting handles at either extremity, "apparently for the convenience of carrying it from lake to lake" (Wood-Martin, 1886, p. 47). But its construction would equally well serve the purpose I have suggested of carrying goods either over land or afloat.

The second problematical wooden object is also of dressed oak, a long, stout flat "board," 15 feet 9 inches long by 2 feet 4 inches across. Both surfaces are carefully shaped. The under-surface, in cross-section, is like a horizontal parenthesis, --, thicker at the margins and curved gracefully to the centre where it projects as a ridge or keel carved from the solid wood and running almost the full length of the board. The keel is $2\frac{1}{2}$

inches broad, and projects $1\frac{3}{4}$ inch from the surface (Pl. XV, 3 and 5). On this surface the wood is bevelled away at each end and towards the sides. The upper surface is flat and smooth, except for a slightly raised rim and two curious low bosses, carefully carved from the solid wood of the board, which lie near the sides and almost opposite each other, about half-way between the ends. The best preserved of these is 4 or 5 inches in diameter and about an inch high (Pl. XV, 4). The ends of the board are rounded.

This board was discovered by Mr B. N. Peach after the second lowering of the water in Eadarloch. It was embedded in silt washed out from Eadarloch towards Loch Treig, and Mr Peach tells me that it must have been washed out of the shore near the island as it was found in a delta formed by the discharge from the Laggan tunnel since 1938.

It is probably the remains of a single-piece canoe, and if that be so the low bosses on the upper surface would have been rests for the feet of a rower. And indeed similar rests have been described in an Irish canoe found in a crannog at Lough Mourne—"the most remarkable feature of this canoe consists of four prominences with abrupt edges (also left in the solid) for the feet of the rowers" (Mumro, 1890, p. 389, and fig. 125).

There is another and perhaps remote possibility. One of the problems of the builders must have been to move the enormous tree-trunks (two were 20 and 21 inches in diameter) from the hillside where they were felled to the loch shore where they could be floated to the island. The shaped board may have been a skid used for bringing these heavy trunks to the water. Its length corresponds to the standard length of the half-timbers (15-16 feet) used in the island: the ridge or keel and the shaping of the bottom surface with the bevelled edges and fore and aft ends would help to keep the skid on its course and reduce friction: the low bosses on the upper surface would act as checks to prevent sideways movement of the trunk upon it, as also would the slight rim at the margins.

(b) *Metal Tools and Weapon.*

Although the woodwork shows clear evidence of the use of a variety of iron tools, remarkably few of these were found during the excavations, and all were fragmentary and much corroded.

A fragment of the tang and slightly curved blade of a knife is $4\frac{1}{2}$ inches long, with blade $\frac{5}{8}$ inch broad: a circular collar lies between tang and blade (Pl. XVII, 1, b). Mr A. J. H. Edwards and Mr R. K. B. Stevenson report that it is unlikely to be earlier than the sixteenth or seventeenth century.

An indeterminate iron fragment, 2 inches long, with a square collar at its centre, was found above the lower hearth in the north-west corner

of the island (Pl. XVII. 1. *f*): and three irregular hand-forged nails $3\frac{1}{2}$, 3, and $2\frac{1}{2}$ inches long were found near the same place (Pl. XVII. 1. *c*, *d* and *e*).

The only iron weapon recovered was part of a sword, identified by Mr A. J. H. Edwards as a backsword, $9\frac{1}{4}$ inches long, with blade $1\frac{1}{2}$ inch broad at the hilt tapering to less than an inch, and tang $1\frac{1}{2}$ inch long, found amongst charcoal and ash in the middle of the island about 1 foot from the surface (Pl. XVII. 1. *a*). It seems likely that this weapon was destroyed by fire, for the rust with which it was encased contained fragments of charcoal which suggest that it had been sheathed in a wooden scabbard. Mr Edwards regards this sword as also belonging to the sixteenth-seventeenth century period.

At one time the smelting of iron took place in the neighbourhood of the island, for the site of a primitive "bloomery" or iron furnace lies near the River Treig at Fersit, about a mile away, and fragments of iron slag still witness to the smelting probably of bog iron ore.

A much folded sheet of thin bronze, $2\frac{1}{2}$ inches deep and about 4 inches broad, was perforated by rectangular holes which probably served as rivet holes (Pl. XVII. 1. *g*). When a paper model of the bronze was folded over according to the indication of folding in the bronze sheet itself, it formed a pointed triangular sheath in which two of the rectangular rivet holes coincided. Its purpose is unknown.

(c) *Objects of Domestic Use.*

Since no kitchen-midden was discovered, little can be said about the food used by the islanders, but on the hearths were remains of calcined bones which include fragments of the limb-bones of a small sheep and a single fragment of a molar tooth of a young ox.

Earthenware.—The only other definite domestic relics were two fragments of earthenware. The oldest, found above the lower hearth in the north-west corner of the island, is the base of a jar, roughly glazed outside and without glaze inside. The bottom is 3 inches in diameter and $\frac{3}{8}$ inch deep, and its lower edge has been rudely trimmed with a knife before firing. Its appearance, according to Mr Edwards and Mr Stevenson, suggests work of sixteenth-seventeenth century date.

The three other fragments, found at the surface, piece together to form part of the neck of a well-glazed, buff-coloured, parallel-sided jug of stoneware. The outside is decorated with horizontal bands, and between two of these, at 2 inches from the rim of the jar, ran a floral design. This is clearly a late importation, eighteenth century or later, and probably had nothing to do with the inhabitants of the island.

Wooden Cones.—Finally, and with doubt, I place amongst the domestic relics some problematical wooden objects. They are cone-shaped, tapering

to a point, and vary in size from $10\frac{3}{4}$ inches long by $3\frac{1}{2}$ inches broad at the head to $3\frac{3}{4}$ inches long and $\frac{3}{4}$ inch broad. Two of these points are solid (Pl. XVII. 2. *e* and *i*); the others are deeply hollowed, and one has a long slot cut in its wall (Pl. XVII. 2. *a-d* and *f-h*). The nine specimens were lying horizontally end to end in a row, west to east, at a depth of 2 feet below the surface of the island, at the level of the deeper north-west hearth, and not far from it. They had obviously been collected and deliberately placed in position. The objects themselves are probably weathered-out "knots" from pine-trees, and a suggestion has been made that they were collected as a resinous "kindling" for the fire. But the points of some are worn by friction, in some the broad ends also are smoothed, and the slot along the side of another (Pl. XVII. 2. *a*) is clearly artificial, while none shows any mark of burning.

For what purpose they were used I cannot imagine, unless the hollow ones may have been stuck in the ground to carry a torch. The only relics to which they bear any resemblance are the tines of deer antlers found at the crannog of Drungay, Co. Fermanagh, said to have been used in the making of fishing-nets (Wood-Martin, 1886. p. 80, figs. 48-52), but probably the resemblance is only superficial.

Birch-bark Rolls.—Several strips of birch-bark twisted into loose rolls were found upon the brushwood layer under the upper platform (Pl. XIV. 2. *c-e*).

(d) *Personal Relics.*

Most varied and interesting of all the meagre discoveries of artefacts were the personal relics. They include objects of metal, leather, and woven fabric.

Silver Coin.—A single coin was found by Mr B. N. Peach in the south-east corner of the island within 9 inches of the humus surface and 6 inches or less below the grass-roots of the surface layer—that is, it was above the stone-covered surface. It was a silver coin of the reign of Mary Queen of Scots, bearing on one side a St Andrew's cross and crown, three roses, and the letters MR, and on the reverse the words MARIA REGINA SCOTORUM. Unfortunately the date was undecipherable and after Mr Peach had made several rubbings the surfaces began to break up so that the design has disappeared. Mr R. Kerr informs me that the above description does not correspond exactly with that of any known coin of Queen Mary, the nearest being the half-bawbee of the period from 1542 to 1558.

The presence of such a coin, though its superficial position shows that it had nothing to do with the builders of the island, points to the continued use of the island in the latter half of the sixteenth century or later, and confirms the evidence of the Gaelic poet referred to in an earlier section.

Two bronze articles were found at greater depth in the island.

Bronze Brooch.—The first is a simple circular brooch of which the pin is missing. It is composed of a crude amalgam of copper and brass, which suggests that the makers were not highly skilled metallurgists, and its construction is equally primitive. For it has been formed from a very thin strip of bronze, curved to form a circle, and joined by an overlap on

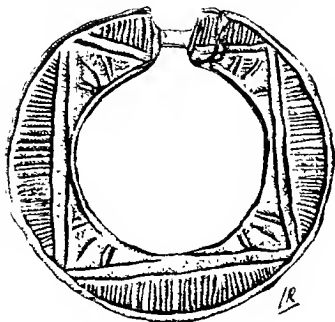


Fig. 19. Bronze brooch.

both sides of the narrow bar on which the pin was hinged. The bar itself is, therefore, formed of two thicknesses of metal and the crudeness of the welding is shown by the presence of the flux, which has the appearance of some sort of resin.

The brooch is $1\frac{9}{16}$ inch in diameter, and the width of its metal circle $\frac{5}{16}$ inch. It is ornamented by an incised design composed of a series of straight lines contained within two circular incisions which follow the outer and inner edge of the circle (fig. 19). The essence of this simple and crudely wrought design is a double-lined square, the sides of which touch the inner circle, and the corners of which rest at the outer edge. Outside the square the spaces are filled with close-set lines; inside, each angle contains an arrangement of a single median

stroke flanked on each side by a double line. All the lines have been cut in the bronze by a sharp graving tool, and, although the workmanship is irregular, the design as a whole is striking enough in its simple repetition.

The brooch resembles the elaborate plaid brooches of the sixteenth century, but its light structure precludes the idea that it could have been used to fasten a heavy garment, and Mr T. D. Kendrick suggests that it may be a cheap variety made for cottage folk as opposed to the more flashy and expensive examples. Mr A. J. H. Edwards considers that the design indicates that the brooch is of late type, belonging to the eighteenth century, and Mr Kendrick concurs in this determination.

The brooch was found at the extreme north end of the island, in the brushwood layer which lay below the outer cross-beam of the upper platform. Since this is not far below the surface of the slope, it may be that it had slipped into that position from a higher level.

Bronze Tweezer-like Article.—The second personal relic in bronze is a small article resembling tweezers, formed of two independent bars of bronze each $2\frac{1}{2}$ inches long, $\frac{5}{32}$ inch across, and $\frac{1}{16}$ inch thick. The top ends of the bars have been hammered slightly wider than the shafts, and there the arms are connected by a bronze rivet, the intermediate portion of which holds them $\frac{3}{16}$ inch apart (Pl. XVII, 1, h).

Tweezers have been found in Roman settlements, at Glastonbury, and elsewhere, but these are made of a single piece of metal and spring is obtained by bending the top end in a wide hoop. Whether the Treig relic was used as a pair of tweezers or in some sort of mounting for leather-work cannot be decided. It was found just above the hearthstone in the north-east corner of the island, 2 feet below the surface and not far above the level of the upper platform. It therefore belongs to an early stage of habitation.

Woollen Fabric.—A single fragment of cloth, unique in weave, was found at the north end of the island just above the level of the upper platform. It is only about 4 inches long in the direction of the warp by $2\frac{1}{2}$ inches broad, and although it is turned in at one end and seems to form a fringe at the other, this appearance is due merely to the decay of the weft threads so that the warp has become loose. Mrs Crowfoot, whose report follows, suggests that it may have been part of a narrow belt, since the fragment appears to be complete from selva to selva (Pl. XVIII. 2).

Microscopic examination of the material of this fabric was made with the object of learning something of the character of the wool which composed it. The fabric itself in its outer parts is a rusty brown, but where the surface has been unexposed it is black. The wool has been dyed, but the presence and distribution of pigment granules within the wool fibres showed that the fleece had been originally brown or "moorit." Further, the wool was fine in quality, the fibres being 0.020–0.024 mm. in diameter, and in the fabric the fibres were very short, like those in the "shoddy" cloth of modern days: but this may have been due to the breaking of the fibres during their long submergence, under the strain of the twist of spinning.

The surface character of the fibres shows that the wool was good for spinning, for the cuticular scales are rather close set and have irregular slightly toothed edges (fig. 20), so that the fibres would adhere well to one another.

I have compared this wool microscopically with that of black-face and Cheviot sheep and of the most primitive of domestic breeds known at the present day—the Soay sheep (see fig. 20). The natural brown colour of the Treig wool, its fineness and its scale pattern show it to be very different from that of the modern breeds and most closely related to the wool of the Soay sheep. These sheep survived in modern times only on one of the islands of the St Kilda group, but there can be little doubt that they represent one of the earliest breeds brought to Scotland by the prehistoric peoples, and that they may be the direct descendants of Studer's sheep, *Ovis aries studeri*, of the Swiss lake-dwellings, as J. G. Millais suggested in his *Mammals of Great Britain*, and of the large-horned sheep whose remains have been found in Roman camps and Romano-

British villages, as stated by General Pitt Rivers, Professor T. H. Bryce, and Professor Cossar Ewart (see Curle, 1911, vol. ii. p. 373). Unfortunately it is impossible to say how long this ancient race of sheep continued to exist in remote parts of the mainland of Scotland as a pure breed or as an admixture with races subsequently imported, although the small short-tailed fine-woolled sheep described in 1578 by Bishop John Lesley as inhabiting the vale of Tweed may have belonged to the latter category (see Ritchie, 1914, p. 103).

Unable to find a cloth of similar texture amongst the small collection of ancient Scottish fabrics in the National Museum of Antiquities of

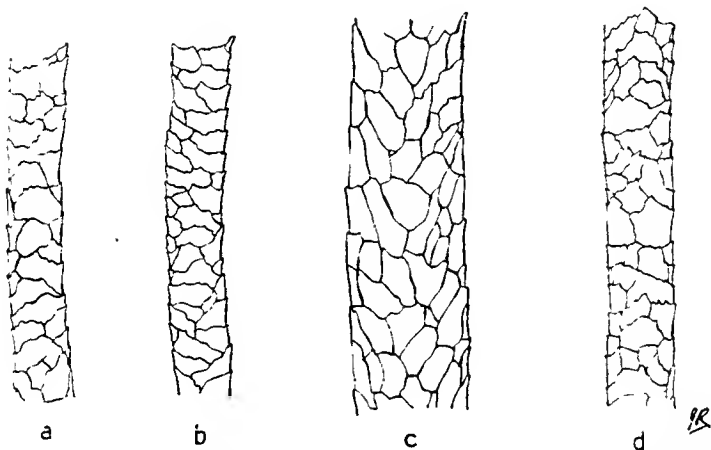


Fig. 20. Wool fibres of some typical breeds of domestic sheep. *a*, from woollen fabric found in crannog; *b*, from primitive Soay breed; *c*, from Scottish black-face; *d*, from Cheviot. Magnified 300 diameters.

Scotland, I sent it, through the kind intervention of Mr T. D. Kendrick of the British Museum, to Mrs Grace M. Crowfoot, whose knowledge of woollen fabrics and expert analysis of the St Cuthbert and other textiles has already proved of great value. Mrs Crowfoot, by examination of the crannog fragment itself and by experiments attempting to duplicate the weave of the fabric, in which she succeeded, has been enabled to draw up an interesting description of this unique sample. Her report is here included:—

NOTES UPON THE WOOLLEN FABRIC FROM THE CRANNOG AT LOCH TREIG.

BY GRACE M. CROWFOOT.

The preserved portion of this fabric is about four inches long, folded over above, with threads cut at both ends, and is therefore incomplete. The original width was probably as seen at present, about two and a half inches, because the selvage is well preserved on the left-hand side and a very

small portion also appears to be present on the right. These selvages are not specially woven as such, but the loops of the weft can be seen still intact and binding the outermost warps. From the presence of these selvages the distinction between warp and weft is certain.

Warp and Weft.—Two qualities of warp can be seen, one coarse and one fine, the weft being finer than the finest warp. The weft is certainly S spun, or in English usage, left spun, as also is the fine warp: the twists are difficult to see on the coarse warp because it is very lightly spun, but I think it is also left spun. There are fourteen blocks of eight fine warps, and one coarse warp is set up at the beginning of the weave and one at the end, while two coarse warps are set between each block of fine warps: the fine warps equal 112, the coarse 28, total 140 warps; the wefts are probably about 40 to the inch.

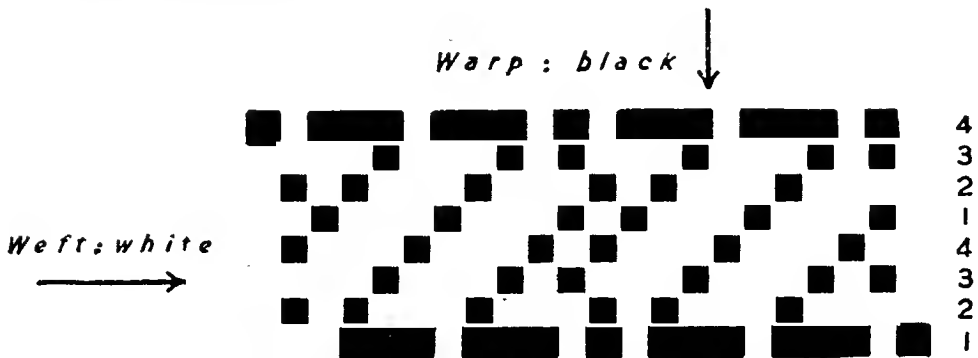


Fig. 21. Diagram of the construction of the woollen fabric, showing two repeats of the weave: the warps, perpendicular, are shown in black, the weft, horizontal, in white. The pattern repeats on four throws of weft, as indicated by the numerals at the side.

Weave.—In order to discover how the fabric was woven I made some trial weaves from material spun from Shetland wool, and to judge from these samples the weave is a four heddle diagonal twill. On the face, the weft passes under three and over one of the warps. The twill is seen to be divided by sunk lines or rills running in the direction of the warp. These are caused by the presence of the thick warps between which the weft passes in a plain or "tabby" weave, and except for these "tabby" lines the twill goes straight across the fabric. The fine warps are close pressed and beaten up hard, which no doubt contributes to the ridged effect: on the face the weft is little seen. The back gives an impression of plain weave, but the twill, fine and squeezed up, can be distinguished in places between the more prominent thick warps in plain weave.

At first I thought the weave must be a three heddle twill, in which the back simulates plain weave; but the samples in four heddle weave are much closer in character to the actual fabric. The diagram (fig. 21) gives two repeats of the weave, the warps being shown in black, the wefts in white; the pattern repeats on four throws of weft.

The Loom, and Comparable Fabrics.—The twills of Northern origin, belonging to the Iron Age, are believed to have been woven on the warp weighted loom; some rare earlier pieces may have been finger woven. The Crannog textile might have been woven by finger weave, or by means

of four rod heddles, or three rod heddles and a shedro on the warp weighted, or some other primitive loom. I know of no material exactly comparable to throw light on this point.

Diagonals were popular in the Roman period, and many varieties, herring-bone, diamond in three and four heddle weaves, etc., appear in the time of the Vikings (see A. Geijer, *Birke III*).¹ but none of these have the peculiar lines or rills seen on the Crannog fabric. The only ancient instances of such rills that I know occur among the textiles of Palmyra (1st-3rd cent. A.D.)—two fine diagonal weaves, "serges cannelés,"² which according to M. Pfister may be of Syrian origin, but these serges are very different in design and texture. The Crannog textile appears to me to be at present unique in character.

Leather Shoes.—Portions of at least three leather shoes were found, all in one place, beyond the north end of the island, and close to the ladder which gave access to the dwelling space (Pl. XVIII. 1). The shoes were found about 18 inches from the surface, higher than the timber lattice of the outworks and lower than the level of the upper platform. It seems likely that at different times they had accidentally dropped into the water from the feet of people climbing the steps to the island, and had sunk beyond rescue.

I have submitted the fragments to the expert examination of Mr J. McIntyre of Bishop Auckland, and his report upon them is as follows:—

"The two shoes—a right and left though not a pair—are made of leather, and although much perished have sufficient remaining to determine their type and method of manufacture. They are both of the same order: short-vamped tie-bar shoes without heels, which have been made by a skilled shoemaker.

"The upper consists of two parts: the front or vamp is made of one thickness of soft leather, and the back of two thicknesses of firm leather, the nature of which prevented collapse in wear. The sole is made of one piece and is strengthened internally with extra thicknesses at forepart and heel, but not as a continuous inner-sole. The seams which close the upper and secure the latter to the sole are sewn with leather thongs, and all seams are reinforced with strips of leather, in places double and sometimes folded. The thong passes through holes in the seams which have been made with an awl, and in parts of the sole-seam this thong penetrates seven thicknesses of leather, namely two inner-soles, outer-sole, single strip, folded strip and upper. The shoe would be made inside out and turned when finished, the parts being held in a wooden clamp during

¹ A. Geijer, "Die Textilfunde aus den Gräbern," *Birka*, vol. iii. (K. Vitterhets, Historie och Antikvitets Akademien), 1938.

² R. Pfister, *Textiles de Palmyre*, 1934. See L. 17, p. 35: "la trame passe en serge 2 dessus 2 dessous, cependant chaque fois après le sixième fil de chaîne il y a un point de taffetas selon schéma fig. 5, il se forme ainsi des rainures dans le sens de la chaîne" (pl. ix, d). Cf. also *Nouveaux Textiles de Palmyre*, 1937, L. 43, pl. vi, a.

stitching. It may be noted, however, that the edge of the vamp of the left shoe has been stitched with needle and thread, doubtless to prevent stretching.

"The shoe is held on the foot by means of bars on either side of the upper, perforated for laces which are tied over instep.

"Slight differences between the shoes may be noted. The left shoe is about size 1, by shape of sole probably that of a small woman, has one inner-sole at forepart with grain of leather uppermost, and has tie-bars as separate pieces secured internally to sole-seam and emerging through slots in the upper. The right shoe is about size 13, fitting a young person of ten or eleven years, has a broader shaped sole, with inner-sole at forepart of two thicknesses having flesh of leather uppermost, and has tie-bars cut in piece with the vamp."

In addition to the two shoes described there were several fragmentary pieces, all found at the same place, which Mr McIntyre describes thus:

"(1) Back of upper with heel counter.

I think this may belong to the left-foot shoe. The counter or stiffener appears to have been lightly attached to the inner thickness: the stitch-holes about $\frac{1}{2}$ inch apart round upper margin.

(2) The thin strip belongs to the above shoe and was sewn round the edge of vamp.

(3) The remaining pieces form the back of a third shoe, and show interesting folding of inner piece to effect the purpose of a stiffener."

On one point I am inclined to differ from Mr McIntyre's interpretation of the structure of the shoes. The narrow strips of single or folded leather which he looks upon as having been inserted to reinforce the seams, where sole and upper are stitched together with leather thongs, appear to me to be the remains of pieces which originally covered the whole sole. The sole part of these pieces has been worn away. My reasons for so thinking are these: (1) the inserted strips are not of regular size around a shoe, but at some parts are broader than at others as if the sole had worn away not quite evenly at the margins; (2) the shoes are well worn, suggesting that the original sole surface, where wear is hardest, is unlikely to have remained intact—on my interpretation two sole pieces have been worn away, leaving only those parts where they were held together by stitching, and which could not be worn away without the disintegration of the whole shoe; on Mr McIntyre's interpretation no sole piece has been worn away; and (3) if the shoemaker considered it necessary to have heel-upper composed of two pieces, in one shoe with a stiffener in addition, it seems unlikely that he would make the sole, which had to bear much more wear and tear, of one complete piece only, even if it was strengthened internally by additional discontinuous pieces.

In the accompanying figure (fig. 22) I have shown in composite diagrammatic form the structure of the shoes as if they were cut lengthwise through the centre to show the leather layers. The thick continuous lines indicate the leather pieces as they survive at present, when two thicknesses appear to be inserted as strengtheners in the seam where upper and sole meet (Mr McIntyre's interpretation). The thick broken lines indicate the supposed position and relationship of former sole pieces which have been worn away (my interpretation).

Mr McIntyre concludes: "The outstanding thing about the shoes is the stitching with thong and the reinforcing of seams with strips of leather

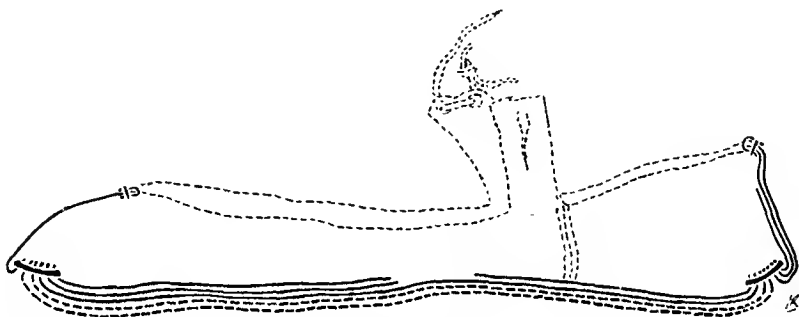


Fig. 22. Leather shoe, showing leather layers as in median longitudinal section. Half natural size.

—thus producing a very strong seam as the remains of the Treig shoes so convincingly show.

"Shoes of the Romano-British period are usually either hobnailed shoes (in which case the nails hold the shoes together) or lighter indoor shoes with upper and sole made in one piece. Whereas the uppers are invariably closed with needle and thread in Romano-British shoes of first- and second-century dates, the small collection which Birley found in the well of the Theodosian principia at Chesterholme, Vindolana, had the uppers of some shoes closed with leather thongs, though not in quite the same manner as in the Treig crannog shoes. There was also in the Vindolana lot an odd shoe with short vamp covering the toes only, as in the Treig shoes, a type not seen by the writer in earlier collections.

"The Treig shoes, therefore, seem to me made with a later and improved adaptation of the thong-sewn seam, used in this case both for closing uppers and securing them to soles.

"The short vamp, tie-bar fastening, typical Romano-British shape of sole of left shoe, and the adoption of improvement in seam lead me to the rather vague conclusion that the shoes belong to some period later than, say, A.D. 500, though how much later I do not know."

10. AGE AND OCCUPATION OF THE LAKE-DWELLING.

The later stages of the occupation of a site such as has been described are often easier to define than the earlier, and for this reason I shall discuss first the period of the final occupation of the Treig crannog and thereafter examine the evidence of its earlier history.

Final Occupation.—The contemporary references to the island and its use, which occur in the verses of Domhnall MacFhionnaigh, who lived about 1600, and the tradition of Keppoch's Council Island, point to the likelihood that regular occupation of the lake-dwelling had ceased by the early years of the seventeenth century, and that it had degenerated to a place of occasional resort for feasting or more serious discussions.

The period of its final occupation is perhaps indicated by the discovery, almost at the surface, of a silver coin or medalet of Mary Queen of Scots, the date of which is probably about 1542–58. This relic, although found at a different part of the island, was on or above the level of the highest hearth: it may have been dropped by one of the occasional visitors, but it is reasonable enough to suppose that it may have belonged to the last period of regular habitation, which may therefore be regarded as the latter half of the sixteenth century.

It has been stated that evidence exists of the occupation of Scottish crannogs during that century. In a footnote on his work on Irish Lake Dwellings, Wood-Martin writes: "In the year 1508 it is of [*sic on*] record that a Scottish monastery granted a lease of a crannog, one of the covenants being that the occupant was to place a certain quantity of stones outside the piling in each year, to protect the structure from the destructive influence of the waters of the lake" (1886, p. 31). Unfortunately Wood-Martin does not state in what part of Scotland the monastery was, nor does he give his authority for the statement. But the statement, with its inferences that in the early sixteenth century Scottish crannogs were occupied and that their continued use was reckoned upon, is so important that it was desirable to discover its origin. With the help of Mr William Angus and Mr Paton it was traced to a lease, dated 24th July 1508, by the abbot and convent of Cupar in Angus, granting to Sir Alexander Turnbull for life their chaplaincy of St Margaret's Isle in the Loch of Forfar. The lease ordains amongst other things that the lessee is bound "to see to the building and repair of the chapel, and houses," and "to make plantation of trees within and without, and to make works of stone for the defence and safety of the loch and its trees, lest the trees be overthrown by the force and violence of the water" (Trans. in Stuart, 1868, pp. 143, 144).

Now St Margaret's Isle or Inch was a fairly large island with remains of at least two stone buildings; it was not an artificial island as had been supposed, but was a natural elevation strengthened by piles and stones

(Munro, 1882, p. 20). It was a protected island rather than an artificial crannog: the lease calls it simply "*insula*," and there is no evidence that it possessed any of the elaborate wooden frameworks characteristic of the crannogs.

The lease of 1508, therefore, affords no proof that crannogs were in active use and occupation in the sixteenth century. Indeed Dr Stuart (1868, p. 147), after referring to the habitation of four crannogs in the county of Antrim in the beginning of the seventeenth century, says: "No evidence of late occupation of this kind appears in regard to any of our known Scottish examples." And Munro, referring to the Celtic area beyond the limits of the Scottish portion of the kingdom of Strathclyde, admits, "I may at once state that there are no data derived from an examination of its artificial islands, nor any relics of their occupiers, which can give even an approximate notion of their chronological range" (1882, p. 287).

The evidence, then, is of more than ordinary interest which suggests that the Treig crannog was occupied during the sixteenth century and fell out of use as a place of regular habitation towards the end of that century or the beginning of the following century.

Earlier Occupation.—We must now ask whether there is any evidence to indicate either the period when the crannog was constructed or the stretch of time during which it was occupied. There are three lines of inquiry available—information derived (*a*) from the relics found, (*b*) from the architecture of the crannog itself, and (*c*) from the timber of which it was built.

(*a*) *The Evidence of the Relics.*—Apart from the silver coin of Mary Queen of Scots, found within 9 inches of the modern surface, the only other relic from the upper layers was the fragment of an iron blade which Mr A. J. H. Edwards identifies as part of a backsword, probably of the sixteenth or seventeenth century. This was found about 1 foot below the humus surface amongst ashes in the middle of the island, where the greatest amount of subsidence had taken place. Its position indicated that it belonged to the late occupation of the island and its date agrees with the suggestion that this must probably have been in the late sixteenth or early seventeenth century.

Beneath one of the hearths which lay on the exposed stone-covered surface at the north-west corner of the island and which belonged to the late occupation lay another at a depth of about 1 foot, and this overlay another a few inches deeper, while the deepest hearth was 2 feet below the stone surface. The hearths mark successive periods of occupation, and since they also indicate the gradual subsidence of the original structure (see p. 28) they may be taken to indicate in all a considerable lapse of time. Now just above the lowest hearth were found several relics: (*a*) fragment

of earthenware jar, (b) iron fragment with square collar, (c) bronze tweezer-like object, (d) fragment of woollen fabric.

Unfortunately none of these relics is definitive as regards period: (b) and (c) are undatable: the earthenware may well belong, according to Mr R. B. K. Stevenson, to the seventeenth century, but the fabric, the weave of which appears to be unique, seems to belong to a considerably earlier period: in neither case is there any certainty.

The bronze brooch is of eighteenth-century date, but so slight an object may have worked its way from the surface through the foot and a half of loose stones to the brushwood layer where it was found. And of the shoes all that can be said is that they seem to be an improvement of the Romano-British type and therefore later than A.D. 500, but that there exists no shoe of exactly similar fabrication with which they could be correlated.

The relics are not very helpful, but such as they are they point in a general and vague way to occupation, even of the lower inhabited levels, about the sixteenth and seventeenth centuries, although the woollen fabric is probably much earlier.

(b) *The Evidence from the Architecture of the Crannog*.—From what has already been said it is clear that the Treig crannog belongs to that peculiar type, of mixed timber and stone construction, which has been found only in Scotland and Ireland. Irish crannogs, and the lake-village of Glastonbury, were inhabited as early as the second or third century B.C., and some of the former may have been built still earlier, but the Scottish lake-dwellings which have been excavated up to the present, mainly in the south-west, belong to the early centuries of our era.

Although it bears a family resemblance to these Scottish structures, the Treig crannog is distinctive. Thus Munro states that prominent structural features characteristic of the Scottish crannogs which had been described up to the period of his account were "(1) upright piles in the form of one or more circles; and (2) the remains of flat beams containing large square-cut holes at their extremities" (1882, p. 260). Now the Treig crannog presented neither of those features. It had none of the scattered piles which sometimes formed prominent outworks of the southern crannogs, and even if the semblance of a palisade was created by the projection above water of the posts holding the upper platform in position, the outline was rectangular and not circular. Indeed the rectangular arrangement was a basic feature of the design of the Treig crannog, and this clearly differentiates it from the southern type, with its circular mounds and radiating timbers.

The working of the timbers is equally distinctive, for square-cut holes in flat beams were absent at Treig, and the timbers were held together by the interlocking of square-cut half-checks (see Pl. VII, 2, 3). Even the

character of the timbers is different, for except in the basal framework squared beams were not found, and the structure was of natural tree-trunks, a few of which had been slightly dressed.

Finally, the mechanical construction, while in a general way agreeing in the succession of its layers with that of other Scottish crannogs, develops several distinctive features. These are apparent in the open framework of the basal timbers and of the upper platform, and particularly in the arrangement of the intermediate timbers, in regularly spaced ranges set at right angles to the current of the loch, in place of the usual succession of layers of beams or trunks of trees set so as to cross or intersect each other. Moreover, the frameworks, instead of being held in position by piles penetrating the timbers, were fixed by posts placed in opposite angles at their intersections. The method of gaining access to the crannog by a ladder projecting from the bed of the loch, and leading presumably to a short gangway, appears not to have been noticed hitherto in Scottish crannogs.

From these facts the conclusions may be drawn: (1) That the builders of the Treig crannog were familiar with the general scheme of construction of the Scoto-Irish type of crannog; (2) that their woodwork is more crude than that of the builders of other known Scottish crannogs, since they made more use of the natural trunks of trees, and except in the basal timbers did not use dressed squared beams; and (3) that they modified, and I think improved, in their island the mechanical design of crannog construction.

These conclusions suggest that the Treig crannog was built at a period later than the crannogs of the south-west of Scotland, and by people to whom rough-and-ready joinery appealed more than skilled carpentry.

(c) *Evidence from the Timbers of the Crannog.*—The main timbers of the island, with the exception of the basal framework, were natural trunks of pine and birch, cut as a rule to a length of 30-32 feet. The pine-trunks were straight and of regular growth, generally about a foot or a little over in diameter and showing practically no taper along their whole length. In one tree the annual rings were counted and numbered 106. It is more remarkable that the birch stems of the intermediate timbers, usually about 7 to 10 inches in diameter, were as straight and almost as regular in growth as the pine, and one of these, 20 inches in diameter, had 118 annual rings. Another was 21 inches in diameter. Johns in his *Forest Trees of Britain* states that the birch prefers soil in which turf overlies sand and "in such situations it attains maturity in about fifty years; but it seldom exceeds 50 feet in height, with a trunk from 12 to 18 inches in diameter."

The crannog was built, therefore, at a time when a close forest of pine and of exceptionally fine birch clothed the neighbouring hills. At present

there are no natural pine-woods about the loch, and the scattered birch-trees are small and of very scraggy growth.

Is it possible to say when the Treig watershed possessed a forest such as would supply the timber of the crannog? There is little more than tradition to guide us. Bishop Lesley, writing in 1578, refers to the "Tor Wod" *Caledonia Silva* "Quhais boundis war sa large, that frome the Callendar and Caldrie Wod to Lochquhaber war extendet" (Dalrymple's translation, 1596), and the brothers Stuart mention the tradition of a great pine-forest which extended from the western braes of Lochaber to the Black Water and the mosses of Rannoch, and which was burned to expel the wolves. Loch Treig lies within the area covered by both references, and the latest period when wolves proved generally troublesome and when the forest burnings for their extirpation took place in this and other regions may be put down roughly as about the middle of the sixteenth century.

The most then that can be safely deduced from the timbers of the crannog is that they must have been cut in a forest that existed probably from prehistoric times till the sixteenth century.

Conclusions regarding the Age of the Crannog.—According to tradition the crannog was visited and used in a casual way as late as the seventeenth century, but the skill and labour expended upon its creation would not have justified its use solely for occasional visits, and its regular occupation probably came to an end, judging by the relics, in the sixteenth century. At that period it would still have been a serviceable refuge-place from wolves as well as from wandering marauders.

Were we to judge by the relics alone, it might also be argued that the crannog was built in the sixteenth century, for none is demonstrably of earlier date, although the leather shoes appear to have affinities with a Romano-British type, and the woollen fabric might well be of a similar age.

It has to be remembered, however, that a crannog is unlike a land dwelling in the sense that when once it has been built its method of construction is entirely hidden from observation. If our crannog, therefore, was made in the sixteenth century, or about that time, it must either have been an independent invention, which is unlikely, or the building of crannogs in Scotland must have been an art practised without serious discontinuity from the time of those south-western examples which date from the Roman occupation of Scotland. For there can be no doubt that the general plan of the Treig crannog is founded upon the established type of the Scoto-Irish examples.

There is at present no evidence of this long tradition of crannog-building in Scotland, though it may be revealed by the excavation of the very numerous crannogs of the Highland lochs. It seems more likely that

the Treig crannog-builders lived at a period in closer contact with the construction of the crannogs of Romano-British times, and the modifications and improvements which they introduced into the design suggest that they lived at the end of or soon after those times.

The idea that the origin of the crannog belongs to a period before the sixteenth century is supported, vaguely, by the assumption of the Gaelic poet that the island had existed for a long time before 1600, at which date, obviously, no tradition of its creation had survived. But it is more definitely supported by the presence of at least three superimposed hearths, indicating a subsidence of 4 feet in one part of the island. This must have taken place over a prolonged period, unless we assume, and it would be a rash assumption, that all the precautions taken to prevent the sinking of the structure had been ineffective and that it had subsided rapidly after being built.

There is another possibility that deserves mention. In the typical Scottish crannog the general rule is that the basal supporting timbers are squared dressed beams sometimes associated with natural trunks, and that the platform or pavement bearing the dwelling-surface is of squared dressed beams. It is odd that in the Treig crannog the arrangement is reversed and that the only squared beams in the structure were found amongst the basal or foundation timbers, whereas the platform, both as regards its framework and the "flooring" which covered it, was of natural trunks. That is to say, the workmanship of the foundation timbers is different and more finished than that of the upper platform and its pavement. This suggests the possibility that the two series may belong to different periods: that while the basal timbers represent the original woodwork of the crannog, the upper platform and its pavement may have been reconstructed at a later date because of the destruction of the original platform by subsidence or decay. In that case the stone-and-earth superstructure of the crannog would date from the period of reconstruction, and the relics it contained would give no pointer to the period of the original construction of the island.

The photographs of the relics in the plates which follow were made by Mr R. J. Fant, Technical Assistant in the Department of Zoology, University of Edinburgh, to whose skill and assistance I am greatly indebted; the photographs of the crannog and its structures were made by me in July 1933. To the Carnegie Trust for the Universities of Scotland I record my thanks for a generous grant contributed towards the defrayment of the cost of reproducing these plates and the text-figures.

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EXPLANATION OF PLATES.

PLATE IV.

1. Side view of the exposed crannog from the west, before excavations had begun. The white band in the background is the new embankment built to raise the West Highland Railway above the water-level of the Treig Dam.

2. End view of the crannog from the south, showing the laminated mound upon which it was built.

PLATE V.

1. Hearth No. 1 of schist slabs in left background, and in foreground part of circular setting of large pebbles, probably the foundation of another hearth.

2. Post-hole in centre of island, probably to carry central support of dwelling.

PLATE VI.

1. Excavation at north end of upper platform, showing

(a) superstructure of stones and earth.

(b) cross-beams of framework of upper platform, the nearest being the outermost beam, succeeded by half-beam with wedge-shaped end.

(c) bedding of platform, and

(d) some of intermediate timbers.

2. Framework of upper platform at centre of island, seen from east, showing two inner longitudinal beams and under them two cross-beams; the end of the spade is resting upon one of these. The two short lengths of trunks above the platform are part of the stringers or "flooring."

PLATE VII.

1. Excavation proceeding between beams of framework shown in Plate VI, 2; gives an impression of the massiveness of the construction of a single rectangle of the frame (*cf.* fig. 11). The men are standing upon the intermediate timbers.

2. End of a cross-beam showing square-cut check for securing an outer longitudinal beam in position.

3. A cross-beam, fallen from its original position, which shows two checks to interlock with longitudinal beams and a notch upon which a buttressing beam bore. This was probably the outer beam on the south of the platform framework.

PLATE VIII.

1. Brushwood packing (mainly heather and bracken) beneath outer cross-beam at north end, part of which is shown at top of photograph.

2. Excavation showing two cross-beams of platform and, at right, one of the upright "wedging" posts. An upper birch trunk of the intermediate timbers is just exposed, and a large boulder lies upon it. Between boulder and trunk, and elsewhere, remains of brushwood layers can be seen.

PLATE IX.

1. Intermediate timbers shown in relation to a cross-beam of platform (at top); here also large boulders rest upon the trunks. On right compressed layers of decayed vegetable matter appear beneath the cross-beams and above the timbers. The tip of the shovel is resting upon a timber of the basal platform.

2. Intermediate timbers; several ranges of natural trunks, usually of birch, lying parallel to the cross-beams, one of which is partly shown at the top of the photograph.

PLATE X.

1. Basal framework at north-west corner of island.

2. Part of basal lattice of birch branches at south-west corner of island.

PLATE XI.

1. Part of basal lattice at north end of island.

2. Key-point of crossed and wedged timbers at north end of island, viewed from the island (*cf.* fig. 16).

PLATE XII.

1. Key-point of crossed and wedged timbers, viewed looking towards the island (*cf.* fig. 16).

2. Birch posts deflected by pressure of island; at north end beyond outermost cross-beam.

PLATE XIII.

1. An early stage in excavation of north end; at right heavy squared timbers lying at an angle and supporting the lateral thrust of the island.

2. Remains of ladder at north end giving access to island, showing the relation of its slope to that of the surface of the island.

PLATE XIV.

1. Wooden dowel-pins and pegs. *a. b.* simple dowel-pins, cut from natural timber; *c.* eight-sided dowel-pin; *d.* portion of eight-sided dowel-pin, extracted from beam of upper platform; *e.* headed pin. About $\frac{2}{3}$ natural size.

2. *a. b.* Clips of oak, cut by adze; *c. c.* rolled up strips of birch-bark found upon brushwood layer under upper platform. About $\frac{1}{3}$ natural size.

PLATE XV.

Wooden vessels.—1, 2. Views in elevation and in plan of dug-out vessel of oak, probably for transport of material. About $\frac{1}{10}$ natural size. 3–5. remains of single-piece canoe of oak; 3. end view showing shape of keel and under surface, about $\frac{1}{10}$ natural size; 4. upper surface, showing raised knobs; and 5. under surface, showing keel, about $\frac{1}{10}$ natural size.

PLATE XVI.

1. Drawing of dug-out vessel of oak, showing dimensions.
2. Cross-section of above.
3. Sample of brushwood layer (mainly heather) which lay under the wooden upper platform.
4. Sample of deposit consisting largely of needles of Scots pine, which formed the mound on which the island rested.

PLATE XVII.

1. Implements, etc., of metal: *a*, portion of blade and tongue of iron back-sword; *b*, portion of tang, cylindrical collar, and curved blade of iron knife; *c*, *d*, *e*, hand-made iron nails; *f*, iron object with square collar; *g*, thin sheet of bronze with rectangular perforations; *h*, bronze tweezer-like article with riveted arms. All about $\frac{1}{3}$ natural size.

2. Wooden points, mostly hollow, of unknown use. About $\frac{1}{3}$ – $\frac{1}{4}$ natural size.

PLATE XVIII.

1. Two leather shoes showing (*a*) shoe for left foot, with toe-cap, and (*b*) shoe for right foot, with straps laced over instep by thong and toggle (*cf.* fig. 22). About $\frac{3}{8}$ natural size.

2. Fragment of woollen fabric; arranged with the warp up and down, the weft horizontal. Slightly under natural size.

PLATE XIX.

Reconstruction of Loch Treig crannog as it may have appeared when in use, showing the landing-place, the appearance of the posts fixing in position the upper platform, if they projected above the water, and a hut of which the only trace discovered was the post-hole for central supports.

III.

A CINERARY URN FROM SANDMILL FARM, STRANRAER, WIGTOWNSHIRE. BY REV. R. S. G. ANDERSON, B.D., F.S.A.Scot.

Read March 28, 1942.

At the farm of Sandmill, a mile to the north-east of Stranraer, facing Loch Ryan on the Shore Road, the land rises from the beach very gradually to a low ridge 50 feet above sea-level and about 150 yards inland. On this ridge, 40 feet from the march wall dividing Sandmill from the farm of Low Balyett, and directly opposite the farmhouse of the latter, is the site of a cinerary urn burial. As frequently is the case, the find was made through a passing plough shearing off the base of the upturned urn and exposing the resultant cavity to an alert ploughman. Fortunately in this instance, the ploughman knew enough about such finds as to proceed with caution; and, an expert not being at hand, managed to excavate the site without further damage to the vessel, and to secure most of the contents.

The ridge on which the burial was placed is largely composed of shingle, and is probably an old sea-beach. Its surface is covered with innumerable comparatively small stones, which were once mixed with many of a notably larger size. The latter, proving obstacles to the plough, have been removed, and the consequent deeper ploughing has led to the discovery of the prehistoric burial. There was no cist, the urn being deposited in the shingle about a foot and a half below the surface. No tradition has been connected with the site, and there are no signs to-day of any stone circle or cairn.

The urn (Pl. XX, 1) is of the cinerary type with overhanging rim, and of a fawn colour. Originally it would stand about 17 inches high: its greatest height now is $15\frac{3}{4}$ inches: the diameter over all at the mouth is $12\frac{1}{2}$ inches: the wall is $\frac{1}{2}$ inch in thickness. Like many others of this type, the wall has been raised by ring-building, and the exterior smoothed off producing a mechanical slip. The urn is both strongly and finely made. It belongs to the second stage of the Cinerary Urn type, where the rim is broadened and has a flange, the neck is still concave, and the shoulder prominent.¹

The collar of the Sandmill urn is $4\frac{1}{2}$ inches deep, with its flange projecting downwards over the neck for half an inch. A stab design of finger-nail curves covers the surface. Evidently the artist's intention was that these should be arranged in eight parallel rings surrounding the collar, whilst the various nubs of these rings, synchronising with those above or below, should suggest a series of vertical lines. But the worker has muddled

¹ Childe, *Prehistoric Communities*, p. 116.

his scheme, so that the number of rings varies at different points, and the details fall into confusion.

From the junction with the collar the neck of the urn measures $3\frac{1}{2}$ inches to the shoulder, and its curvature is quite pronounced. It is ornamented with a lattice design, which has been incised on the surface of the clay with a smooth square-edged tool, almost an eighth of an inch in breadth.

The shoulder of the urn is strongly marked, and gives no sign of disappearing, or of any immediate change to the third form in the evolution of this type. From the shoulder the urn slopes down in a slightly convex curve to the base. Unfortunately the base is entirely lost, but it appears to have been between 5 and 6 inches in diameter.

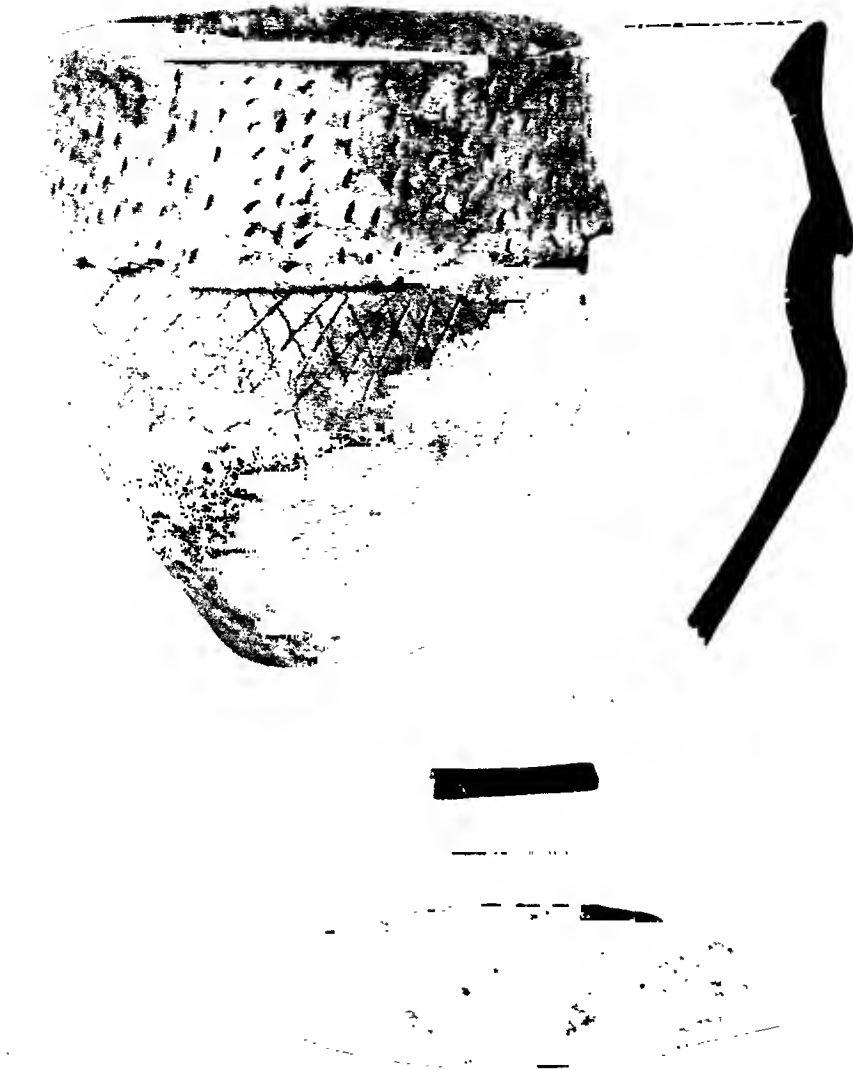
The rim of the urn, from a narrow edge on top, descends steeply into the interior for $1\frac{3}{4}$ inch, and is decorated with two parallel rings of the stab design.

The Cinerary Urn with the Overhanging Rim in England has been noted for the quantity and characteristics of the grave-goods frequently associated with it. The Sandmill burial, though falling far behind notable finds of the type in England, yet is remarkable for the number and character of the objects associated with it. The grave-goods consisted of a battle-axe, a bronze knife or razor, an ornamented bone bead, and three shaped stones. Two or three worked flints were discovered at the first excavation of the site, but there is no certainty that they had actually been in the urn. Several have been found since in the immediate neighbourhood.

The ceremonial axe (Pl. XXI, 1), made of volcanic rock, lava, a stone not uncommon in the south-west of Scotland, was found split into several fragments, perhaps by the heat of the funerary pyre, but has been put together completely. It is of the type that expands from the shaft-hole towards the blade and the butt. It measures $4\frac{5}{8}$ inches in length, and is $1\frac{1}{4}$ inch wide at the waist, and $2\frac{3}{4}$ inches at the blade. The butt end is a truncated cone, 2 inches wide at the base, and tapering to a disc $\frac{3}{4}$ inch in diameter. The shaft-hole, equidistant from the ends, is cylindrical throughout, and 1 inch in diameter. The edges of the perforation, though slightly irregular, are not splayed or countersunk. The weapon is decorated by three narrow grooves forming a reeded outline to the sides.

The resemblance of such axes to those so common in Scandinavia during Montelius' phase III of the Northern New Stone Age has been often noted, and might suggest a derivation of the Sandmill axe from across the North Sea, especially as cognate forms can be cited from north-eastern Scotland. On the other hand R. A. Smith¹ has presented a typological series illustrating a local development of forms like ours in the British Isles from the flat-faced types associated with our Early Bronze Age (AC) Beakers, and

¹ *Archæologia*, lxxv, pp. 90 ff.



Urn, head and blade from Sandmill.



Battle-axe and "whetstones."

R. S. G. ANDERSON.

has illustrated specimens with expanding blade and conical butt from English graves of the early Middle Bronze Age. Typologically as well as geographically the Sandmill axe would serve as a link between these and the closely related axes from south-western Scotland—Fardenreoch, Montfode, Nith Lodge,¹ and Chapelton,² in Ayrshire; from which in turn might be derived both the "Bann type" of Ireland and "mace-heads" like the celebrated one from Crichtie in Aberdeenshire. Even the reeded border which recurs again on the axes from Montfode and Chapelton as well as on some Bann axes and the Crichtie mace-head appears already in England at Goodmanham (Yorks).³ The Chapelton specimen, though very similar to ours, was associated with a Cordoned Urn that in the typology of funerary pottery is a stage or two posterior to the Overhanging Rim Urn from Sandmill.

The fact that the axe is formed out of a stone of brittle and unequal texture suggests that it was not intended for war purposes. It was probably designed for ceremonial or funerary use, for which it would be well adapted from its attractive appearance.

The bronze instrument (Pl. XX. 3) is incomplete and bent. It consists of an oval blade $2\frac{1}{8}$ inches long and the stump of a broad tang of which only $\frac{5}{8}$ inch survives, separated from the blade by slight shoulders. The greatest breadth of the blade is $\frac{7}{8}$ inch and its maximum thickness $\frac{1}{16}$. Round the edge is a paper-thin margin, $\frac{3}{16}$ inch wide, leaving the centre an elongated oval prolonged into the tang. The margin has been formed by hammering, but has been further thinned *on one face only* by bevelling.

It is not easy to decide whether this little blade should be classed as a razor or a knife. Razors have often been found with cinerary urns or contemporary cremations, and the smallness of our blade would seem more appropriate to a toilet article—it is actually only half the size of razors of the Balblair type. The grinding of the edges on one face only would, moreover, facilitate use in shaving. But the tang is relatively much wider than in the most nearly comparable razors like those from Balblair and Rogart in Sutherland⁴ and Pollacorrage in Ireland. It is not so different from a couple of razors from south-western England, *e.g.* from Priddy, Somerset,⁵ or the Irish Carrowjaines type⁶ that is associated with very late Cordoned Urns.

On the other hand the Sandmill blade, though only half as large, does agree very accurately in plan with a knife-blade from the Late Bronze Age settlement in Heathery Burn Cave, Co. Durham.⁷

It is true that the latter knife is provided with an oval socket cast in one piece with the blade, and is thus a member of the large series of socketed

¹ *Proc. Soc. Ant. Scot.*, lxxii. p. 245, fig. 8.

² *Archæologia*, l.c., fig. 32.

³ Evans, *Ancient Bronze Implements*, fig. 256.

⁴ Evans, *Bronze Implements*, fig. 242.

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⁵ Childe, *Prehistory of Scotland*, fig. 32.

⁶ Childe, *Prehistory of Scotland*, fig. 54.

⁷ Childe, *Prehistoric Communities*, fig. 48.

two-edged knives from the British Isles. But Dr Estyn Evans¹ has pointed out that such socketed knives were probably derived from tanged knives with similarly shaped blades in the same way as socketed spearheads of the Arretton Down series were derived from tanged spearheads. The Sandmill blade might therefore be regarded as representing a tanged version or precursor of the Heathery Burn variety of socketed knife. From faint indications on the metal it would seem that the handle met the blade in a line similar to that marking the junction of the blade and socket on the English knife (the finder of the urn recovered a piece of bone, "bent and something like the half of a jaw" that may have been the original handle, but threw it away as valueless!), while the small shoulders are very similar to those on tanged knife-blades. Still our instrument is so small and slender in comparison with normal tanged or socketed knives that, if a knife at all, it might almost be regarded as a miniature. Miniature tools and weapons were made in the period when cremation was in vogue in Denmark, Sicily, and other parts of Europe.

Finally, the bend of the blade deserves notice. For nearly $1\frac{1}{2}$ inch from its tip the blade is virtually flat, but the rest of the blade with the tang is bent along the line of its major axis. This curvature suggests comparison with the well-known curved knives from Late Bronze Age hoards. But in these knives the whole blade is bent in an arc while the hilt is straight.² So the bend in our blade is more probably due to distortion by the heat of the pyre.

The Wessex chieftains and their disciples among the Urn folk carried perforated whetstones in their kits. No such article was associated with our burial; but in the urn were three pieces of sandstone that seem from the marks upon them to have been put to a similar use (Pl. XXI, 2).

The largest, $4\frac{1}{2}$ inches long, 2 inches broad, and 1 inch thick, is made from a fine-grained whitish sandstone, probably of the Carboniferous-Calceiferous series, not of local origin. The second is a flat yellowish coarse-grained sandstone, $1\frac{1}{2}$ inch thick, $3\frac{1}{4}$ inches in greatest length, and $2\frac{5}{8}$ inches in greatest breadth. The bronze blade has apparently lain on the low triangular shelf in the upper left-hand corner which was deeply stained with verdigris. The third, $3\frac{3}{4}$ inches long by $2\frac{3}{8}$ inches wide, bears on one face an axial groove that might have been made in sharpening a pointed tool.

Among the cremated bones in the urn was a tubular section of bone, possibly the legbone of a bird, $\frac{7}{8}$ inch long and $\frac{1}{8}$ inch thick, engraved on the surface with fine lines forming a chevron (Pl. XX, 2). It was evidently a bead and might indeed be compared to the segmented beads of imported faience found in English graves of the Wessex culture.

¹ *Archæologia*, lxxxiii, p. 190.

² As shown in the illustration by Evans, *Bronze Implements*, fig. 247, and Callander, *Proc. Soc. Ant. Scot.*, liv, p. 125.

The Sandmill burial forms a valuable addition to the short list of closed finds associated with Cinerary Urns in Scotland. In particular, the blade offers a possibility of correlating the funerary record with that constituted by hoards of bronzes, though, owing to the anomalous character of the instrument, this correlation cannot claim to be very precise. Whether the implement be classed as a razor or as a knife, comparable relics would be expected in hoards only of the Late Bronze Age. The Sandmill burial should then fall within this long period. On the other hand, the urn is typologically of a type that might in southern England be found with the relics of the preceding Middle Bronze Age. It appears therefore that fashions in funerary ceramics were more conservative than those determining metal equipment. Even this relatively early form of Overhanging Rim Urn arrives in Scotland in the Late Bronze Age when it had already been superseded by new styles farther south. In southern England the relevant razors seem in fact to belong to the Deverel-Rimbury phase or Period VI in Childe's division.

In the urn the grave-goods lay among the cremated remains of the body and wood ashes from the pyre. Altogether the contents filled about a quarter of the urn space, the greater part being wood ash. Cremation had been so thorough that little could be learned concerning the body.

I have to thank Prof. Alex. Low of Marischal College, Aberdeen for very kindly examining the bones forwarded to him, and for his report.

I have to thank Mr John Hardie, the finder of the urn, for bringing it to my notice, and Mr Nelson, the tenant of Sandmill, for permission to work in the field. My thanks are also due to Mr A. J. H. Edwards for the illustrations which he has kindly made for this paper, and for assistance in acquiring necessary information.

Finally, I have to acknowledge my great indebtedness to Prof. Childe who, by a generous contribution from his wide knowledge of the subject and his experience, has in the argument of this paper helped me to clothe the skeleton of the past and make the dry bones to live.

NOTE ON CREMATED REMAINS ASSOCIATED WITH A CINERARY URN FOUND AT SANDMILL, WIGTOWNSHIRE. By Prof. ALEXANDER LOW.

A number can be recognised as belonging to an adult human skeleton: 6 pieces of flat bones of skull, a fragmentary petrous bone, left articulation for lower jaw, 2 fragments of lower jaw: a fragmentary vertebra, and numerous pieces of limb bones varying in length from $\frac{1}{2}$ inch to 2 inches.

The bones have been very thoroughly cremated and all traces of animal matter have been removed.

A further small consignment showed only a few more pieces of the skull and a bicuspid tooth.

IV.

FURTHER URNS AND CREMATION BURIALS FROM BRACKMONT MILL. NEAR LEUCHARS, FIFE. BY PROFESSOR V. GORDON CHILDE, D.LITT., D.SC., F.S.A.SCOT., AND PROFESSOR DAVID WATERSTON, M.D., F.S.A.SCOT.

Read March 28, 1942.

The discovery of an urnfield through the exploitation of a sandpit at Brackmont Mill, near Leuchars, was reported to the Society in March 1937 by the late Dr J. B. Mears, who then described the site and the thirteen vessels discovered up to that date. Continued removal of sand led to the exposure of additional urns and unurned burials between 29th September and 10th November 1939. Dr Mears once more assisted the proprietor, Mr Lewis H. Spence, in conserving and recording the burials. But his sudden death, which deprived our Society and Scottish archaeology of an enthusiastic and expert investigator, prevented him from describing the new discoveries. Indeed even his rough notes have unhappily disappeared and with them Mr Spence's sketch plan of the urnfield. However, Mr Spence himself has kept not only the urns and their contents but also an accurate record of the circumstances of their finding. This he has kindly placed at our disposal and generously supplemented with verbal information. He has further permitted the urns and cremated remains to be taken to the Museum of St Andrews University for study. Two objects of exceptional interest then found in one of the urns have already been described in a Note, published in the last volume of the *Proceedings*. We present here a catalogue of the new burials and relics arranged in the order of their discovery and as numbered by Mr Spence.

The discoveries of 1939 comprise nine urn burials, together with two unurned cremations and also half a Beaker urn found by itself unassociated with any bones or other relics. It lay a hundred yards or so away from the majority of the burials which were concentrated in an area of 8 to 10 yards square. The urns and burials came to light at depths varying from 1 to 3 feet below the contemporary turf surface. The Overhanging Rims Urns were all inverted over the incinerated remains; their bases in some instances have been destroyed by the plough. The remarkable Food Vessel Urn II and the curious vessel numbered VI stood mouth upward.

CATALOGUE OF THE URNS.

- I. Overhanging Rim Urn, 16 inches high; diameter at mouth, 14 inches; at shoulder, 16 inches; at base, $4\frac{1}{2}$ inches; walls 0.6 inch thick.

Decoration: on the rim. 3 inches wide, band of irregular cross hatched lozenges bordered above and below respectively with pendant and erect triangles obliquely hatched: all incised in the clay with a rather blunt-pointed implement probably of bone. On the shoulder row of finger-tip impressions (fig. 1 and Pl. XXII).

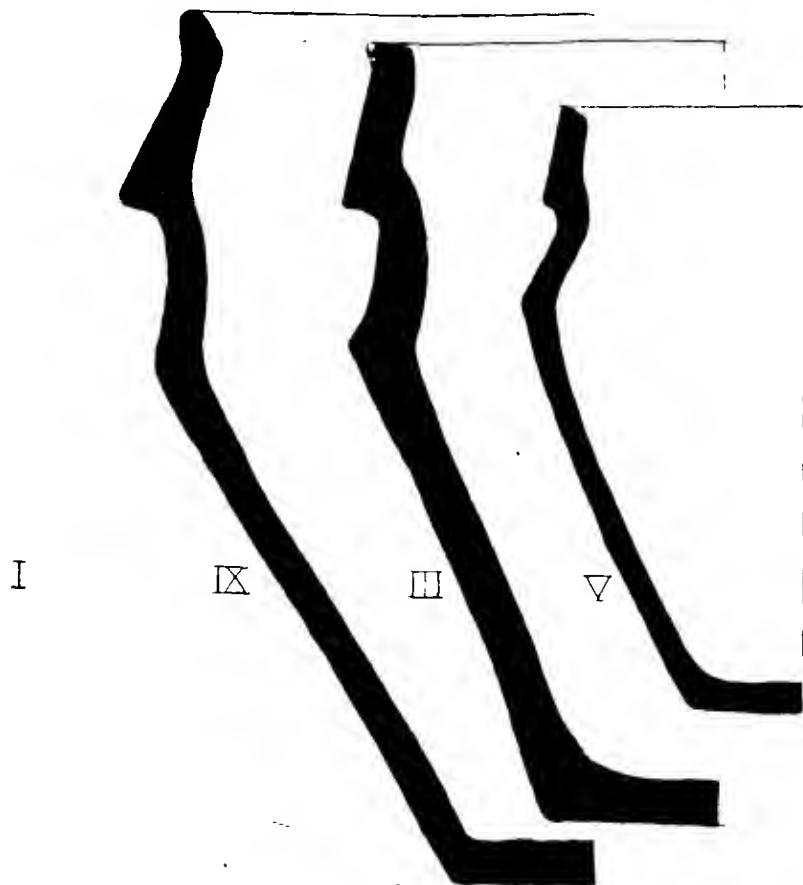


Fig. 1. Urns I, III, V and IX. 3.

It contained: Biconical Incense Cup, $1\frac{1}{2}$ inch high: diameter, mouth, $1\frac{1}{2}$ inch: keel, 2 inches: base, $1\frac{1}{2}$ inch. The wall is pierced at the keel by two very small holes set close together. Decoration: upper part erect triangles, lower erect and pendant triangles, all incised possibly with same implement as the containing urn; the base is plain (Pl. XXIV, 2).

- II. Food Vessel of Abercromby's type E. $6\frac{1}{2}$ inches high: diameters, at mouth, $7\frac{1}{2}$ inches; shoulder, $6\frac{1}{2}$ inches; base, 2.8 inches. Decoration: neck, lattice of cord imprints bordered on both sides and interrupted by horizontal cord impressions; on and just below shoulder four horizontal cord impressions; inside rim, oblique cord impressions bounded above by one, below by three horizontal cord impressions.
- Covered by Lid of rather coarse clay, 7 inches in diameter, surmounted by an oval knob pierced along its major axis (Pl. XXV and fig. 2).
- III. Overhanging Rim Urn, 13 inches high; diameter at mouth, $11\frac{1}{4}$ inches; at shoulder, 12 inches; at base, $5\frac{1}{2}$ inches. Walls $\frac{1\frac{1}{8}}{16}$ inch thick. Decoration: on the rim pendant triangles, obliquely hatched, incised as in Urn I, bordered above and below by horizontal cord impressions; on shoulder rather sinuous, carelessly incised lines vertical or oblique; on lip incised chevron, triplicated in places (Pl. XXII).
- IV. Beaker of Type B, diameter at base 3.1 inches, neck and rim as well as half the body missing; base $\frac{9}{16}$ inch, body $\frac{5}{16}$ inch thick; made of rather coarse clay. The interior and core are black, but the outside has been smoothed and burned a reddish mid-colour with black blotches. Decoration: round the edge of the base a circle made by the impression of a single length of cord, the ends of which overlap. On body above base a band of 9 horizontal cord imprints, then a blank band, then another band of at least 11 parallel cord imprints extending across the shoulder as far as the point where the neck is broken off (Pl. XXIV).
- V. Overhanging Rim Urn, $9\frac{1}{2}$ inches high; diameter, mouth, 7 inches; shoulder, 9 inches at base. Decoration: on rim band of alternately hatched triangles in impressed cord technique bordered by horizontal cord impressions; on neck incised lattice pattern (Pl. XXII and fig. 1).
- VI. Small Urn, $4\frac{1}{2}$ inches high; diameter at rim, $4\frac{11}{16}$ inches; at shoulder, $4\frac{7}{16}$ inches; at base, $1\frac{7}{8}$ inch. Decorated with incised patterns all over exterior and on inside of neck (Pl. XXIV and fig. 2).
- VII. Overhanging Rim Urn, in fragments, probably 14 inches high; diameter at mouth, 15 inches; at base of collar, 16 inches; at base perhaps $5\frac{1}{2}$ inches. Decoration: on rim two rows of patterns executed by the impression of a length of coarse twisted cord--above, erect triangles filled with eight horizontal imprints, the interspaces being occupied with from three to four imperfect pendant triangles; between two horizontal cord impressions; below alternately hatched triangles. On neck incised lattice. On

shoulder finger-tip impressions. Inside bevelled lip, lattice composed of cord impressions (Pl. XXIII and fig. 3).

- VIII. Overhanging Rim Urn, base missing, diameter at mouth 12 inches. Decoration: on neck, incised chevron the erect triangles formed thereby being filled with generally seven similar but very irregular triangles, while the pendant triangles are hatched with thirteen uneven horizontal lines; on neck incised lattice; inside lip oblique scored lines (Pl. XXIII and fig. 3).

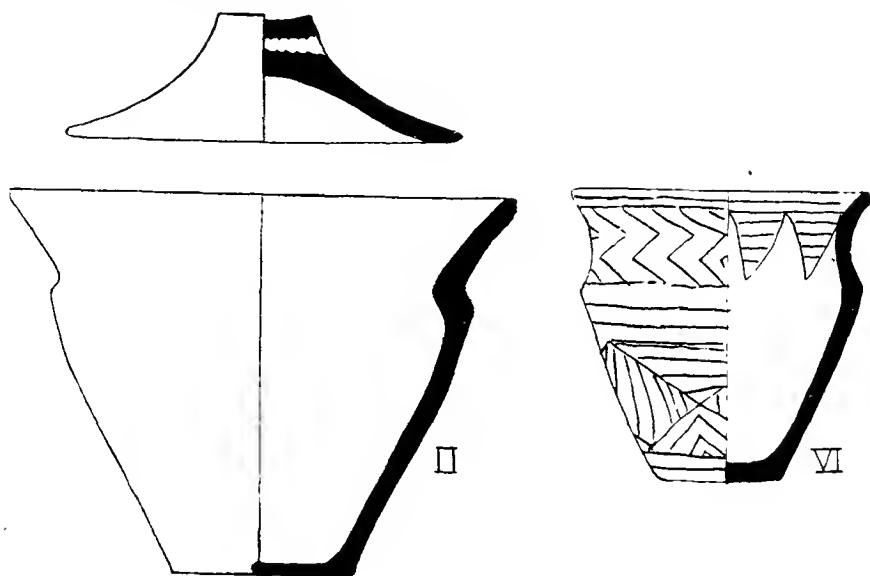


Fig. 2. Urns II and VI. $\frac{1}{4}$.

Urn VIII contained: Biconical Incense Cup of black clay 0.7 inch thick at base, 0.5 inch at keel, and 0.4 inch above keel, diameter 1.8 to 1.95 inches inside rim, 3.30 to 3.45 inches at keel. At one side of rim there is a broken projection suggestive of a lug, but at the opposite side the rim is broken away altogether. It is therefore possible that the semblance of lug is merely due to distortion by heat. The clay is certainly cracked at other points by "over-firing," presumably through exposure to the pyre. The walls are decorated with two bands of lattices finely incised, the base with two concentric circles respectively $1\frac{1}{2}$ inch and $1\frac{1}{4}$ inch in diameter, the innermost circumscribing a chequer pattern. Two small holes pierce the walls at the keel as usual (Pl. XXIV).

- IX. Overhanging Rim Urn, $13\frac{1}{3}$ inches high; diameter at mouth, 12 to $12\frac{1}{2}$ inches; at shoulder, $13\frac{1}{2}$ inches; at base, $4\frac{1}{4}$ inches; walls $\frac{5}{8}$ inch thick. Decoration: on neck a band of vertically hatched pendant

triangles and then below a band of oblique hatchings between two horizontal lines, on neck lattice pattern, all incised as on Urn I (Pl. XXII and fig. 1).

This urn contained the ivory buckle and bone toggle described in *Proceedings*, vol. lxxv, Note 1 (fig. 4).

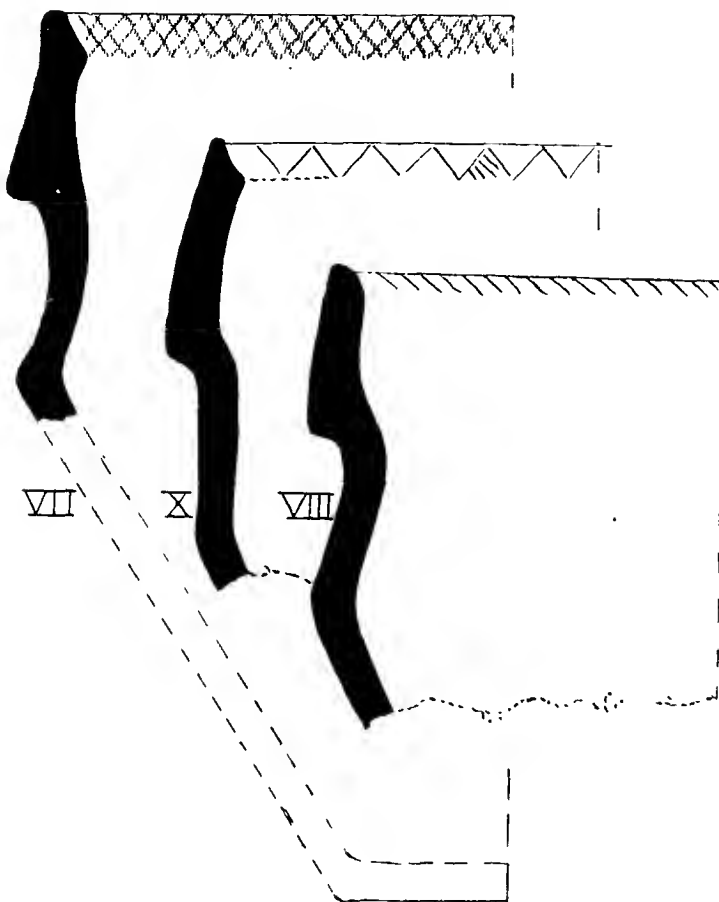


Fig. 3. Urns VII, VIII and X. ½.

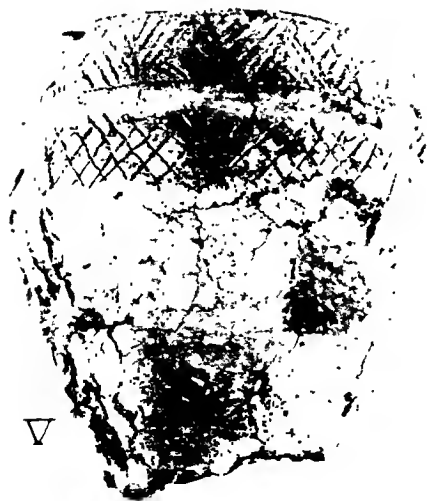
- X. Overhanging Rim Urn with flattened shoulder and neck filled in, base missing. Diameter at rim 12 to 12½ inches. Decorated on collar with two chevrons between horizontal lines, the triangles thus formed being subsequently filled in with alternating hatchings, all incised. The incisions are rather sharp and sometimes discontinuous, but are not in the true stab-and-drag technique. On the internal bevel of the rim there is a chevron, one surviving



I



III



V

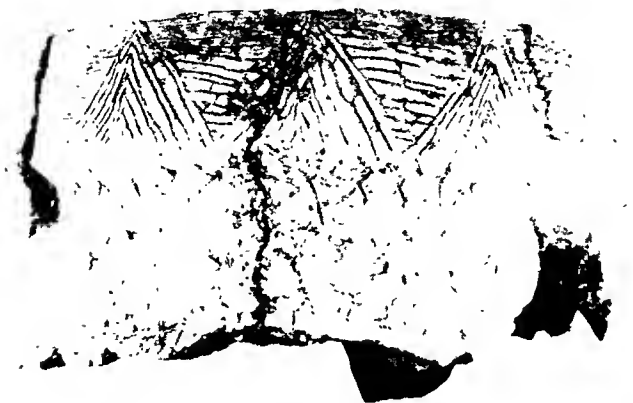


IX

Urns from Blackmont Mill.



VII



VIII



X

Ums from Blackmont Mill.

V. GORDON CHILDE and DAVID WATERSTON.



Left: Incense cup from Urn VIII.

Right: Urn VI: Incense cup from Urn I: Beaker fragment.



Food vessel from Brackmont Mill.

triangle in which has been hatched. The vestigial neck lacks decoration (Pl. XXIII).

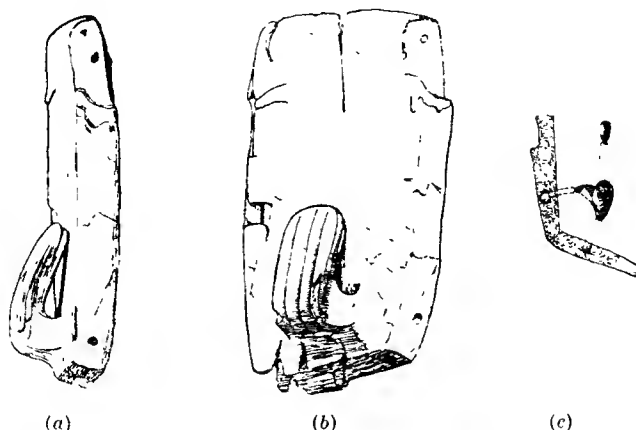


Fig. 4. The ivory buckle: *a*, in profile; *b*, showing fluting on the hook; *c*, diagram of the holes and tunnels at each corner. ($\times 2$.)

From the central small pit the tunnels, shown by dotted lines, pass to the end, the edge, and reopen on the same surface as the pit.

THE CONTENT OF THE URNS.

- I. The heap under this urn consisted of fragments of bones up to 2 to 3 inches in length. A number could be identified. They included imperfect portions of the head of the right humerus, glenoid fossæ of scapulae, portions of the radius, hip bone, axis vertebra, and the alveolar margins of the maxillae, fragments of the mandible, and 24 teeth. The fragments were too small and imperfect to indicate the age and sex of the individual, but it can be said that they were from the skeleton of an adult, and that the smallness of the fragments and teeth would indicate a female rather than a male. Among the bone fragments was a small round bead with a central aperture. This proved to be a fossil encrinite.
- II. Here there was a small quantity of fragments and bone dust, the fragments small, thin, light, and none individually identifiable except the petrous temporal bone of an infant or very young child. Their size and texture confirmed that they were portions of the skeleton of a very young, possibly a new-born, infant.
- III. The heap of fragments was much larger, being sufficient to fill two flat boxes each 9 inches by 12 by 2. The individual fragments also were larger than in the others. Conspicuous among them were portions of the bones of vault of the skull, very white in colour, light in weight, hard and almost like porcelain, they gave almost

a metallic ring when knocked together. They were fissured and bent by heat, some like a twisted dry leaf. The fragments ranged in size from small spicules, rods, or plates of bone, a quarter of an inch in length, up to rods and plates 4 to 5 inches in length. There were some small imperfect teeth, but no clear evidence to indicate age or sex. One portion of the vault with the external and internal occipital protuberances was male in type rather than female, but not conclusively so, and clearly adult.

- V. A small quantity of debris was all that was found here, sufficient to fill only the half of a box 5 by 2 by 3 inches. Among them could be identified the petrous temporal bone of a very young child, and fragments and crowns of some unerupted incisor and molar teeth. These were insufficient to give the exact age, but clearly the remains in this case also were those of a very young and possibly of a new-born child.
- VI. In this case also there was nothing but a small amount of bony debris sufficient to cover the floor of a small box 4 by 5 inches. The fragments included the petrous and squamo-zygomatic portions of the temporal bones of a very young child, the basi-occipital and an ex-occipital, the body of sphenoid, and fragments of the shafts of some immature long bones of the limbs, all of which gave conclusive indication that in this case also the remains were those of a young or newly born infant.
- VII. The remains here consisted of a small quantity of bone fragments, all of which were very white in colour. Among them could be identified small portions of fragments of the vault of the skull and an axis vertebra. They had formed part of the skeleton of an adult, but the sex could not be made out.
- VIII. A box, 5 inches by 4 inches by 4 inches, sufficed to contain all the fragments found with this urn. The fragments were all small, distorted by heat and almost all unidentifiable, but a small portion of the symphysis menti with some alveoli, showed adult characters. The bones had been rather slender, and suggested that it might have been a female skeleton, but this cannot be definitely stated.
- IX. There was a large number of fragments sufficient to fill two boxes each 9 inches by 11 inches by 3 inches. All the fragments were small, a few being 2 inches in length, the others smaller. They were all very white and dry and like those from Urn III. They were from an adult, and the sex was indeterminable, but the external occipital projection on one fragment was almost certainly male, and a talus which had survived was another larger than usual in a female. There were 24 teeth, and they also were larger than in any of the other remains.

XI. (Unurned burial.) There was a mere handful of fragments, the largest about two inches square, from the vault of a skull. The surfaces of the fragments were dark in colour, and a few flakes of charcoal were with them. Some fragments contained parts of some cranial sutures whose condition showed that the remains were those of an adult. Some fragments of bones were too small to be from an adult, but it was impossible to make out whether they were from the skeleton of a child or of an animal.

DISCUSSION.

Including those described by Dr Mears in 1937,¹ the exploitation of the sandpit at Brackmont Mill has now brought to light a cemetery of 18 cremation burials, 16 urned. Of the ossuaries 13 are Cinerary Urns of the Overhanging Rim type. Six urns of this type described above, as well as three of the urns recovered by Dr Mears, are typical specimens of Stage III in the evolution of the Urns as traced by Grimes²: in all the distinction between rim, neck, and shoulder is emphatically maintained. Indeed save for their large size all these urns could be matched in barrows of Piggott's Wessex Culture in south-western England. In two of the earlier urns, Mears' Nos. 2 and 3, as well as in his fragment 2*a* and in our Urn X, the neck has been filled out in the manner proper to Stage IV of the evolutionary series. In other words, as far as the large urns are concerned, the traditions of the parent English culture have been pretty consistently maintained throughout the life of the community to which the cemetery belonged.

Two of our urns contained incense cups of the biconical type that is distributed all over Great Britain in association with Overhanging Rim Urns. Though not of the Grape Cup or Aldbourne type peculiar to Wessex, they have the same connections with southern England as the urns that enclosed them.

These connections are happily confirmed by the ivory buckle contained in Urn IX: for, as pointed out in the Note published in 1940-41, this is closely allied to the famous gold buckle from the Wessex burial in Bush Barrow, Normanton, Wilts.³ Even the bone toggle, although immediately belonging to the group of four other toggles from eastern Scotland north of the Forth⁴ and significantly similar to those from Late Bronze Age cremation burials in Denmark, can be compared to a gold toggle bead from the "Gold Barrow," Upton Lovell, Wilts⁵--a good Wessex burial.

¹ *Proc. Soc. Ant. Scot.*, lxxi, pp. 252 ff.

² *Guide to the Prehistoric Collections*, National Museum of Wales, p. 91.

³ Childe, *Prehistoric Communities of the British Isles*, fig. 38, 3.

⁴ To the list given by Childe, *Preh. Scot.*, p. 137, add Loanhead of Daviot, Aberdeenshire, *Proc. Soc. Ant. Scot.*, lxx.

⁵ *Devizes Museum Catalogue*, i, No. 52.

In view of the tenacious conservatism of the Urn folk, no certain conclusions as to the absolute date of our cemetery can be drawn from the consistent retention of the Wessex tradition: at most one might suggest that, since the Wessex culture began rather before 1400 B.C. and the cognate Danish toggles are dated plausibly between 700 and 650 B.C., our cemetery should have been in use somewhere between these limits. On the other hand, the facts adduced suggest that the cemetery covers a period not too long to be treated as a unit of the large size that units of prehistoric time necessarily assume.

The remaining urns, not of the Overhanging Rim type, are not incompatible with this assumption. No. II is a Food Vessel of Abercromby's type E, a rare variety hitherto encountered only in Ireland. In comparison with its Irish relatives indeed this isolated Scottish example looks poor and degenerate. Its body is bare of the rich decoration seen on the best Irish specimens, and such ornamentation as it does exhibit is sparse and unimaginative. Nevertheless both the use of cord impressions and the presence of decoration inside the neck are in accordance with Irish tradition.¹ At the same time the plain unbevelled rim leaves no excuse for confusing the Brackmont urn with an "English" Food Vase of Abercromby's type 3.

Moreover, alone among Scottish Bronze Age vases to date, our Food Vessel is provided with a pottery lid. Now this feature too can be paralleled in Ireland. Gogan² has illustrated a bowl of type E from Carn Tigh-eamach Mhic Dheagaid, on Nagle's Mt., near Fermoy, County Cork, that was covered with a lid in the shape of a truncated cone. A similar lid covered a more anomalous urn from Danesfort, Co. Kilkenny.³ Incense cups were of course more frequently fitted with pottery lids. Since one of these was the eponymous cup from Aldbourne⁴ of the Wessex culture, it, like the buckle, provides a cross-link back to that culture.

Chronologically the appearance of a Food Vessel in a cemetery of Overhanging Rim Urns is not surprising: from England and Wales instances indicative of an overlap between Food Vessels and Urns have often been recorded. In Ireland Food Vessels are even found in association with Urns, supposedly later than any here described, *e.g.* with Encrusted Urns. Type E in particular, though associated in one Irish burial with a grooved "Wessex" dagger typical of the earlier part of the Middle Bronze Age, certainly lasts into the Late Bronze Age in Eire.⁵ Gogan even treats some as *La Tène* in date!

Hence there is no doubt that Urn II indicates Irish influence in Fife at

¹ *E.g.* Ballon, Co. Carlow, Childe, *P.C.B.I.*, pl. ix, 2; Belfast Museum, No. Wk. 112, no provenance, both with cord ornamentation.

² *J. Cork, Hist. and Arch. Soc.*, xxxiv, 1929, 57-70.

³ Coffey, *Bronze Age in Ireland*, fig. 82.

⁴ Abercromby, *ib.*, No. 213.

⁵ Childe, *P.C.B.I.*, pp. 131-3.

the period of our cemetery. Such influence is well attested in the presumably earlier period, usually termed the Early Bronze Age, both by Irish halberds of copper and by Food Vessels of Irish type. In the Late Bronze Age too Irish metal ware was widely distributed in Scotland. Theoretically our urn should illustrate such influence in the intermediate period. But in view of the notorious difficulty of correlating the funerary record with that provided by bronzes after the period of the flat axe, it would be premature to attempt to fix the period of contact so precisely.

The Beaker, Urn No. IV in our catalogue, need not be treated as part of the cemetery since it was found broken and without any associated bones or relics about 100 yards from the main group of urns. It is a cord-ornamented Beaker, presumably of type B, examples of which are not unfamiliar on the eastern coasts of Scotland from the Lothians to Caithness and have already been recorded in Fife.¹

V.

TWO DONSIDE CASTLES. BY W. DOUGLAS SIMPSON,
M.A., D.LITT., F.S.A. SCOT.

Read February 28, 1942.

The valley of the Don above Alford has long been famous for its chain of ancient castles. Unfortunately most of these are now in a ruined and neglected state; and with the economic stress that the changing circumstances of our time, and above all the present war, impose upon their owners, it is to be anticipated that these picturesque and often historic buildings are doomed inevitably to slow disintegration and final disappearance. It is the purpose of this paper to place on record descriptions of two of these Upper Donside castles. Both of them are buildings of much architectural merit, neither has been fully described before, and both are fast hastening to utter decay.

TERPERSIE CASTLE.

Terpersie, or Dalpersie, Castle, in the parish of Tullynessle, stands, at a height of 685 feet above sea-level, near the head of a romantic glen hidden away in the heart of the Correen Hills, about three and a half miles west-north-west of Alford. At the mouth of the glen are the parish church and hamlet of Tullynessle, where a cart-road leaves the turnpike, and by this the ruin may be reached in a fifteen minutes' walk. On every side

¹ *Proc. Soc. Ant. Scot.*, lxxviii, p. 150.

it is enclosed by wooded or heath-clad summits; and the building itself is hemmed in by trees and the offices of a farm, so that the visitor is almost

upon it ere he catches sight of its grey walls and roofless, crow-stepped gables. Despite its unpretentious appearance, and notwithstanding the lamentable ruin that has befallen it in recent years, the building is of considerable architectural importance, and its interest in this respect is enhanced by its historical associations. It appears to be the earliest dated example of the characteristic Scottish "three-stepped" or Z-type of castle, which is specially common in the regions north of the Mounth; and it is also the example in which the peculiar features of this type of building were first recognised—by the Englishman Billings, who devotes to it the only plan given in his well-known work on the *Baronial and Ecclesiastical Antiquities of Scotland*.

The castle (see measured drawings, figs. 1-3) consists of a rectangular main building, 28 feet by 18 feet, having a round tower, 17 feet in diameter, at each of two diagonally opposite corners, north-east and south-west.¹ It was three storeys high, containing on each floor a single large apartment in the main building, and a smaller chamber in each of the towers. Contrary to the usual practice, the basement of the main building has not been vaulted: the hall floor which forms its ceiling rested on a scarcement with joist holes. This basement room formed a store, lit by four narrow loopholes and entered on the east side by a door, low, lintelled, and provided with the usual double rebate for an outer wooden door and an inner

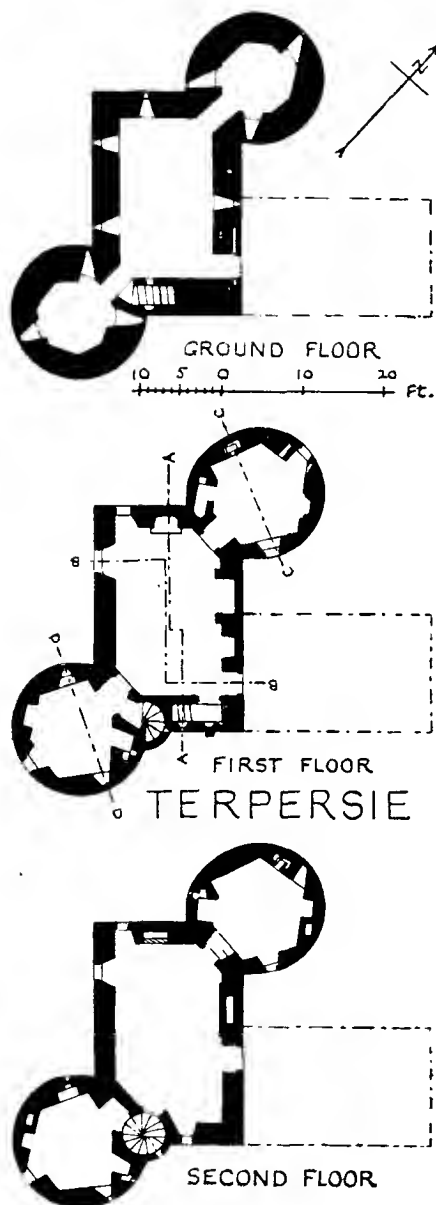


Fig. 1. Terpersie Castle: Plans.

¹ I have assumed for convenience that the longaxis of the building lies north and south. The true orientation is shown on the plan.

iron "yett." The latter was secured by a drawbar. At this level, the round towers each contain a vaulted cellar, circular on ground plan but developed above into a rudely formed heptagon. The only light afforded to these cellars reaches them through three gunloops provided in the walls of each, and arranged so as to enfilade the main building as well as to command the field. At this level, the walls are 3 feet thick.

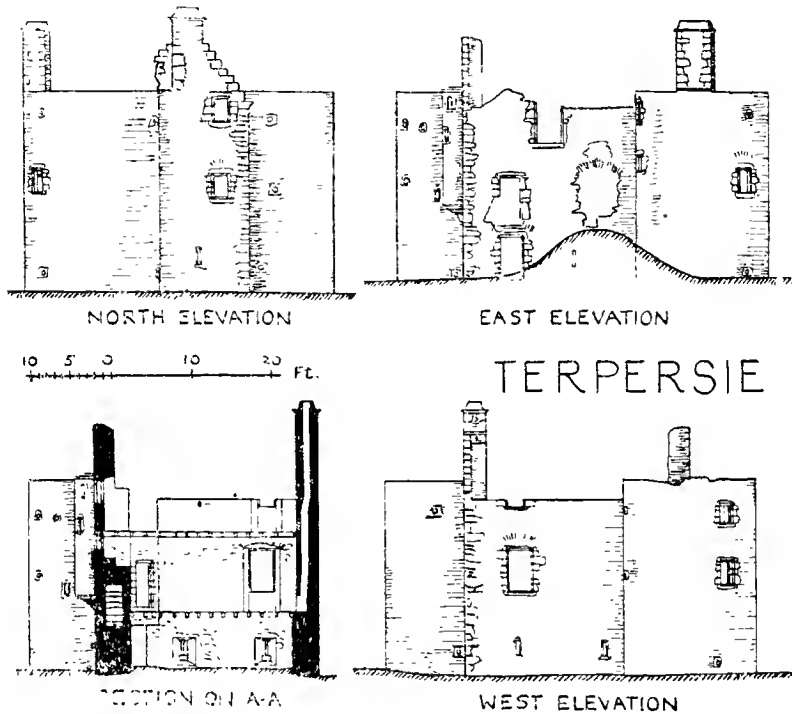


Fig. 2. Terpersie Castle: Section and elevations.

It is notable that in the present castle the door of access to the basement is not placed in a re-entrant angle, as is usually the case in buildings of this class. Immediately above the entrance is another door, also lintelled, giving access to the hall on the first floor. This had a large fireplace in the east wall. In each of the west, north, and eastern walls there is a window, and in the south wall is a door giving access to a straight stair ascending from the basement. This stair is 2 feet 11 inches wide, and its roof ascends in sections corresponding to the steps. It is lit by a couple of loopholes, one at the base and the other at the stair-head. An internal opening, opposite the lower loophole, supplies borrowed light to the basement of the main house. The upper loophole has a shallow sink, with a projecting stone spout, fitted into its sole. Near its head the stair has been blocked

by a cross-wall. Subsequently, the hall was divided by a partition, and a small fireplace of rough workmanship was inserted in its north gable.

On this level, the rooms in the two towers are hexagonal on plan, and each is provided with a fireplace and a garderobe. The south-west tower room has a single window and two gunloops, while the north-east tower room has two windows and an aumbry, gible-checked for a shutter and

neatly fitted with a stone shelf. This room will no doubt have been the laird's chamber. On either side of the north-east window are two carefully built shafts, carried horizontally through the wall and ending outside in small holes, now blocked but still visible externally in the dressed stones on either side of the window. These openings are too narrow for firearms, and it is difficult to imagine what purpose they can have served, unless perhaps for ventilation.

From the passage into the south-west tower room a newel stair, in a corbelled turret set in the re-entrant angle between the tower and the south gable of the main building, ascends to the upper storey. This stair is 2 feet 6 inches in width. The upper floor is arranged in the same

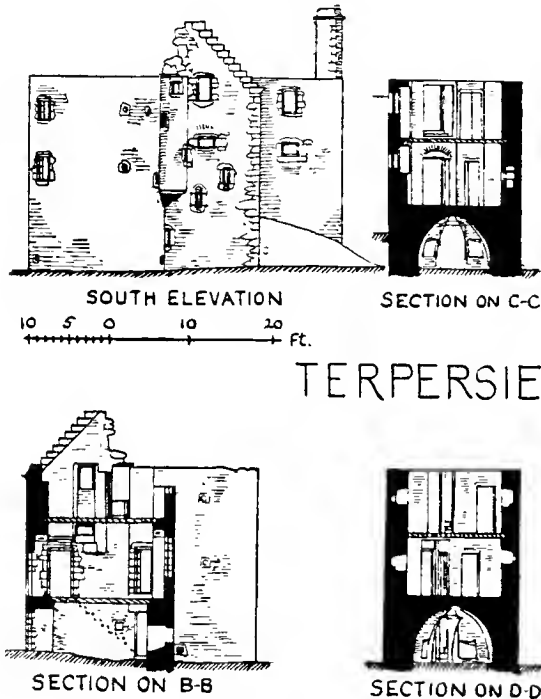


Fig. 3. Terpersie Castle: Elevation and sections.

way as the main floor, and as its details are fully set forth on the plan, they need not be further described.

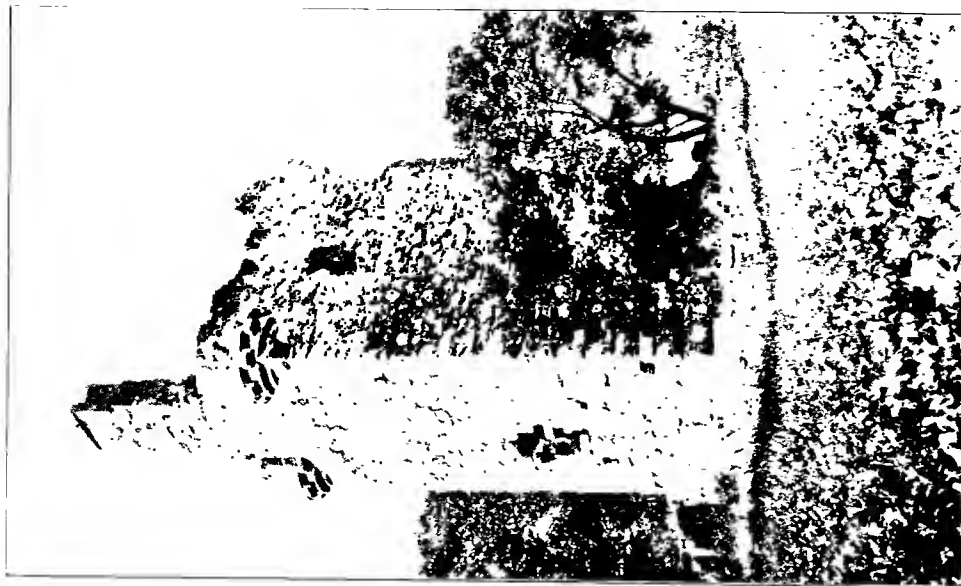
The masonry of the castle (see Pl. XXVI, 2) is rubble work of the kind prevalent in the north country during the sixteenth century, consisting of surface gathered boulders more or less horizontally bedded, with a very free use of small packing material. Roughly dressed stones are used for the quoins. The outer walls had their pinnings "battered over" with mortar, leaving the larger stones exposed, and the inner walls were plastered and white-washed. The main building was finished with crow-stepped gables having curved spur stones, and the chimneys have had moulded copes. On the north chimney of the main house the cope has a double hollow-chamfer, with filleted upper edges, all very sweetly profiled. Red sandstone is employed for lintels and jamstones, gunloops, the newel stair, and the corbel-



1. Terpersie Castle: Base of corbelled turret.



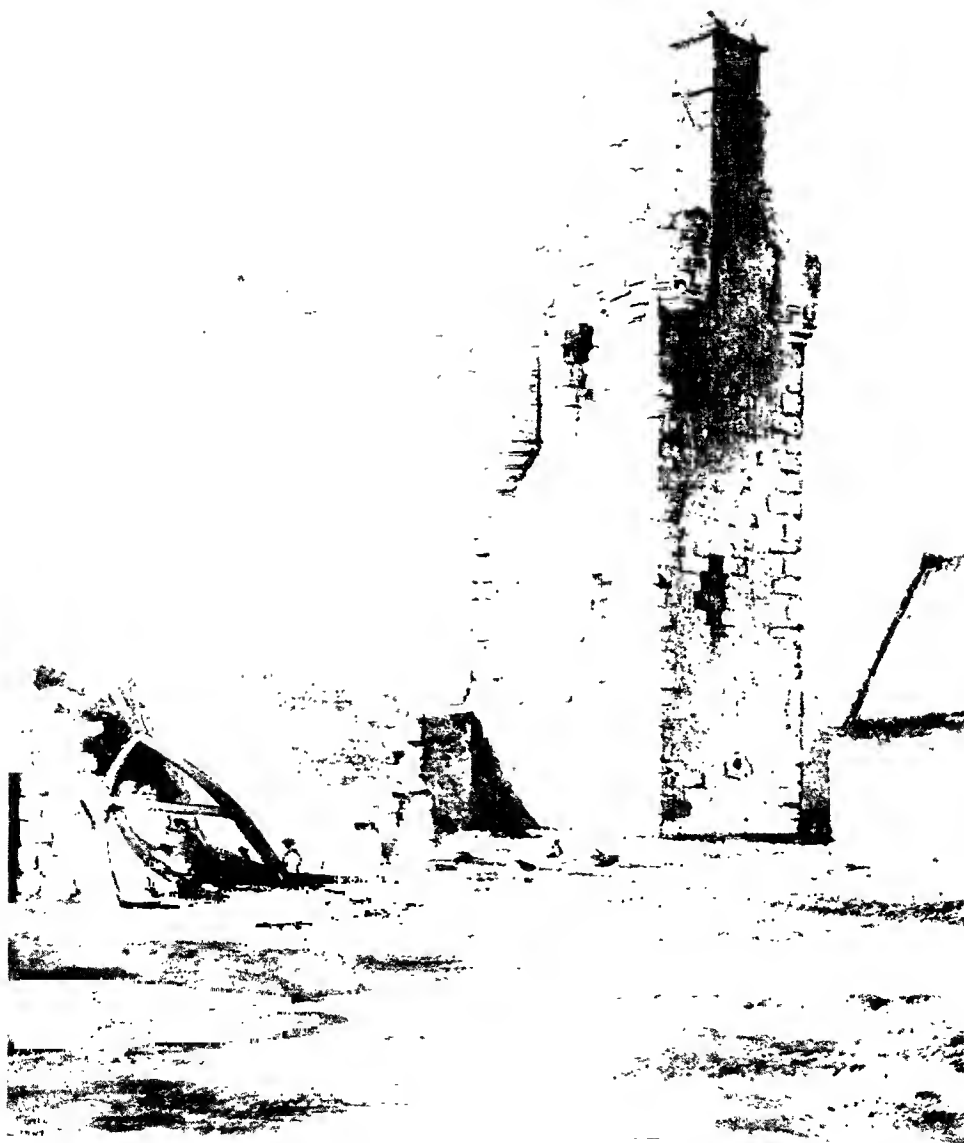
2. Terpersie Castle: View from south-east.



2. Towie Castle: View from south-east.



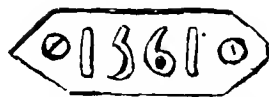
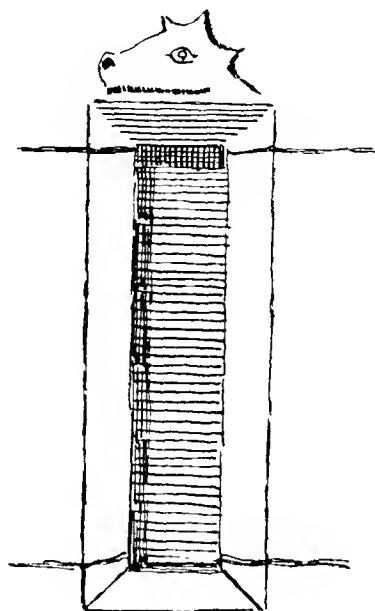
1. Terpetrie Castle: View from north-west, circa 1885.



Towie Castle: View from west, drawn by James Giles, R.S.A., 1841.

W. DOUGLAS SIMPSON.

ling of its turret, and the contrast between this warmly tinted material and the grey granitic and schistose boulders of the walling adds to the piquancy of the building. For rougher lintels, the local andalusite mica-schist, which breaks so easily into flat slabs, is used, and the jambs of the loopholes in the basement of the main building are each made of a single stone of this material, set on end. The windows and doors are wrought with a heavy chamfer, ranging from $2\frac{3}{4}$ to 4 inches. All the windows were barred, and are grooved for glass—in the larger windows on the upper half only, the lower part having been shuttered. Over the lintels of the principal windows are rough relieving arches. The gunloops are plain circular openings, varying between $4\frac{1}{2}$ inches and 6 inches in diameter, with a large internal splay: they are each cut in a single stone. Beneath the lower staircase loop in the south gable there was formerly to be seen a panel (fig. 4), carved in imitation of a label affixed with screw nails, and displaying, in very comely figures, the date 1561. Above the loophole was the boar's head of the Gordons. Owing to the progressive disintegration of the building, this loophole with the carved detail was taken out some years ago, and, in order to preserve it, has been built into an internal wall at Knoekespoek House, where it forms a charming niche. On the lowest corbel of the stair turret, adjoining this loophole, is the letter G., for Gordon (Pl. XXVI. 1). Above this lowest member, the corbel table consists of three filleted courses. All the decorative detail of the castle is very carefully thought out and executed, and the little building has been one of much architectural distinction.



Daylight Height, $18\frac{1}{2}$ "
 Breadth, $4\frac{1}{8}$ "
 Chamfer, 3"

Fig. 4. Loophole from Terpersie Castle now at Knoekespoek House.

Later, a long wing was added on the east side of the original building, containing a kitchen in the basement and two storeys above, with a new outer door and an internal newel staircase. This building is now demolished, but its plans are given by MacGibbon and Ross.¹ This new wing provided

¹ *Castellated and Domestic Architecture of Scotland*, vol. ii, pp. 205-8.

a dining-room on the first floor; and it was doubtless then that the old hall was subdivided and the old stair blocked. Although owing to its ruinous condition no positive indications remain, it is probable that the door leading into the old hall on the first floor was made when the new wing was added, and that this now became the principal means of access, *via* the new stair, to the living rooms in the original building.

According to the Balbithan Manuscript,¹ the castle was surrounded by a moat, of which no trace now exists. It will have been fed by the Esset Burn, which flows past to the west.

For all its seclusion, Terpersie is not unconnected with incident. William Gordon, the first laird, was a cadet of Lesmoir,² and acquired the lands in 1556 from the Bishop of Aberdeen. He appears to have borne his part in the troubles of his day, fighting at the battle of Corrichie (1562), and also at those of Tillyangus and the Craibstone (Aberdeen) in 1571, as well as at the battle of Brechin in the next year. In 1561 he built the castle, as recorded on its walls. In 1645, Terpersie Castle was burnt by the Covenanting army under General Baillie—not during the campaign of Alford, as is usually stated, but while he lay encamped “betuixt the kirkis of Coull and Tarlan” in May of that year.³ The marks of the conflagration may still be traced, particularly on the south-west tower, and many of the freestone dressings are badly splintered with fire. George Gordon, the fifth laird, was concerned in the murder, under barbarous circumstances, of Alexander Clerihew, tenant of Dubston, a property belonging to Lord Forbes, across the Esset Water from Terpersie. This shocking affair took place in November 1707, and although an indictment of Gordon and his two sons is preserved among the papers at Castle Forbes,⁴ no action seems to have been taken against the perpetrators. The last laird, Charles, being the elder of the two sons involved in this outrage, took part in the rising of 1745, and returning in disguise to his home after Culloden, was unwittingly betrayed by one of his bairns, who called out “Daddy” in the presence of redecoats ransacking the house. A recess where he hid himself during the search, under the roof of the south-west tower, was long pointed out. The unfortunate father was duly hanged at Carlisle (15th November 1746); the eldest boy, a lad of sixteen, who had been “out” with his father, was banished to Jamaica, where the scion of so many proud lairds became a mahogany cutter. His wife and other children were turned out of doors; the estate was forfeited, and, like so many others, was bought up by the York Buildings Company. Terpersie’s

¹ *House of Gordon* (New Spalding Club), vol. i. p. 46.

² For the Gordons of Terpersie, see *op. cit.*, vol. ii. pp. 327-72.

³ John Spalding, *Memorials of the Troubles*, vol. ii. p. 172.

⁴ Printed by A. and H. Tayler, *Cess Roll of Aberdeenshire*, 1715 (Third Spalding Club), pp. 120-2. The Clerihew family were of long standing in Tullynessle. In the parish graveyard is the monument of Alexander Clerihew, farmer in Middleward, Tullynessle, who died 1st May 1818, aged 67 years.

last letter to his wife, written the night before he died, is notable for its simple dignity and pathos.¹

Eventually the Terpersie estate became the property of the Gordons of Knockespoek, in whose hands it remains. The castle itself was inhabited as a farmhouse so recently as 1885. Its destruction since that period is one of the most deplorable cases of vandalism and wanton neglect in Scotland. The whole of the new wing was demolished to provide materials for a byre, the roofs of the original portion, having become unsafe, were taken down, and now there remains but an empty and mutilated shell, fast crumbling down into utter decay—overgrown with rank weeds and shrubs, and choked with fallen stones, rubbish and filth. Fortunately, good pictorial records exist of the building while it was still intact, and enable us to understand what a charming and distinctive little piece of old Scottish architecture has been heartlessly sacrificed.² In the original structure, the main building had a high-pitched roof with dormers, and the towers were capped with conical helmets surmounted by ball-finials. The annexe was of plainer design, but had a round arched door, with bowtell moulding, dormer windows, flat skews, and a moulded chimney cope.

The measured drawings submitted herewith are prepared from a pencil survey made about 1912 by the late Mr George A. C. Moir, architect, Aberdeen. They are of value because the ruins have greatly deteriorated since the survey was made. I am indebted to Mrs Moir for placing the original drawings at my disposal. The photographs on Pl. XXVI were taken by Dr John Craig, F.S.A.Scot., Aberdeen. The sketch reproduced as fig. 4 is made from a photograph by Mr A. W. Ross, Schoolhouse, Clatt, who also kindly took the measurements of the loophole.

TOWIE CASTLE.

The church and castle of Towie occupy a striking position on the crest of an old terrace of the River Don, which forms a steep grassy slope, about 20 feet in height, overlooking the fertile haugh through which the river now winds, in graceful loops, eastwards towards Sinnahard and

¹ *The Lyon in Mourning* (Scot. Hist. Soc.), vol. i, pp. 252-3.

² See the beautiful water-colour by James Giles, R.S.A., dated 1840, published by the Third Spalding Club (*Aberdeenshire Castles*, plate lxvi); the lithograph in Sir Andrew Leith Hay's *Castles of Aberdeenshire*, 1865, p. 23 (for the date of this work see *Aberdeen University Review*, vol. xxiii, p. 204, note 5); the drawings of Billings (1845-50) and MacGibbon and Ross (1887) already referred to; a sketch by William Leiper, R.S.A., done about 1884, in Captain Douglas Wimberley's *Notes on the Family of Gordon of Terpersie*, 1900; the sketch by W. Taylor in the second (1887) edition of Leith Hay's book, p. 142; and a fine photograph, dated 1870, in the *House of Gordon*, vol. ii, frontispiece. The illustration reproduced herewith, Pl. XXVIII, is taken, by courtesy of Aberdeen Journals Ltd., from *Picturesque Donside*. The photograph from which it was made was taken by Robert Brown, Inverurie, about 1885.

Drumallachie. The castle stands at the extreme lower point of this terrace, the ground falling rapidly from the base of the building—on the north side towards the river, and on the east and south-east sides, more gently, into a wide hollow through which descends a small tributary, the Water of Towie. Behind the castle stand the church and churchyard, with the manse, manse steading, school and schoolhouse old and new, the parochial hall, and the farm of Mains of Towie; the whole group of buildings forming the nucleus of the parish, and together almost achieving the dignity of a village. Westward, the site is defined by a deep transverse hollow, or miniature ravine. Hence the position is both a commanding one and also one difficult of access. Withal it is a spot of great beauty. The tall

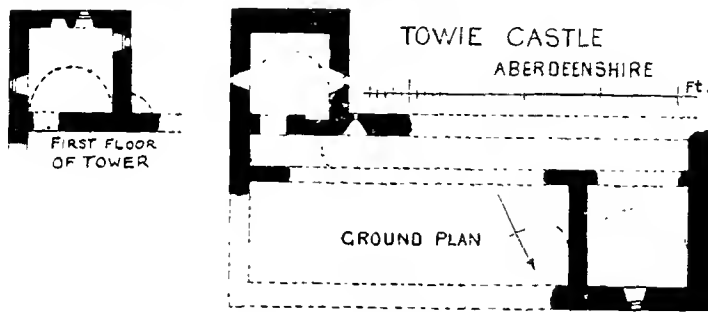


Fig. 5. Towie Castle: Plans.

turreted tower of the old castle, and the plain yet dignified church, surrounded by the headstones and table-stones of those whose work is done, are embosomed in venerable trees: and as the turnpike road up Strathdon lies a mile away on the opposite side of the river, the ancient baronial centre is vested in an atmosphere of old-world peace that is ill to come by in these bustling and fretful times.

As originally built, or designed, Towie Castle (see plans, fig. 5) consisted of an oblong main building, measuring about 62 feet 6 inches by 25 feet, over walls 2 feet 8 inches thick: to the east end of its south front, and projecting from this front only, is attached a tower, measuring 12 feet 6 inches by 15 feet 3 inches. The basement was vaulted throughout, and contained a row of cellars in the main house, with a corridor of access along the south side, and another cellar in the tower. But all the main building has disappeared save the western end cellar and the walls adjoining the tower, which last, though ruinous, still stands to its full height. The western cellar is now in the final stages of decay. Large portions of its vault have collapsed in recent years, and the back or north wall—in which is a small window, whose dressed stones were subsequently withdrawn and the opening built up from inside with stones bedded in clay—has parted company with the vault, and now leans outward at a dangerous angle.

In the corridor, a loophole survives near the re-entrant angle of the tower. It is well formed in Kildrumny freestone, and the daylight measurements are: height, 2 feet $6\frac{1}{2}$ inches: width, $3\frac{3}{4}$ inches, within a $2\frac{1}{2}$ inch chamfer.

The tower has contained three full storeys and a garret. Its basement is a vaulted cellar, entered from the long corridor, and lit by a loophole on either side, east and west. In the front wall outside are seen two pieces of freestone rather roughly formed and placed like the two halves of a circular gunloop, but they are not in contact with each other and there is no internal evidence of such a gunloop having existed.¹ The first floor formed a private room, entered off the hall on the main floor, the joist-holes of whose ceiling remain in the northern wall of the tower. This private room is vaulted, the height to the crown of the vault being about 14 feet. In the south wall are a fireplace and a window, and in each side wall is a window. Above this was another room, now inaccessible: and from this room a turret stair in the re-entrant angle mounted to the tower garret.

The masonry of the tower is typical of the late sixteenth and seventeenth centuries in the north country. It consists of uncoursed rubble of surface gatherings—granites, felstones, quartzites and schists—with an occasional piece of freestone and one or two ice-borne boulders of the conspicuous and handsome Glenbuchat diorite. Pinnings are very freely employed as small packing material between the large stones. The quoins are formed, quite roughly, of boulders, though care has been taken to select those of a shape suitable to produce a fairly accurate corner: where necessary, they have been roughly dressed for this purpose. From all the windows and the fireplace the wrought stones have been torn out, but the rough relieving arches remain. At the wall head, the tower finishes frontally with two boldly corbelled turrets, within which rises a tall chimney stack. These turrets have two courses of continuous filleted corbels, above which is a label-moulded or key-pattern course. The quoins below mitre into the middle course of corbelling. All this enriched work is very carefully executed in granite. In the frontal angles of the turrets are small gunloops, screened by projecting stones. Between them these turrets reduce the gable to a mere chimney stack, which is carried up, with one lateral offset, to a height of some 40 feet above ground level. There is the usual projecting cope. On the sides of the chimney are the raggles of the conical turret roofs. The staircase in the re-entrant angle is carried out on four courses of continuous filleted corbels, wrought in granite. As at Terpersie, the outer walls of the castle have been "battered over" with mortar, and the internal walls were ground with plaster.

Both in the tower and the main structure the vaults have been built

¹ This feature is shown in Giles' drawing, reproduced herewith (Pl. XXVIII), by courtesy of the Third Spalding Club.

separate from the side walls. This weakness in construction, together with the thinness of the walls in proportion to the height of the building, is mainly the cause of the unfortunate condition in which the ruins are found to-day—in spite of the excellence of the mortar, the interiors of the walls having been, for the most part, grouted in run lime. Although the tower at first sight appears to be in a much sounder condition than the detached vault, its front wall is seriously breached, and its two vaults are in a parlous state.

Probably the entrance doorway of the castle was in the middle of the south front, with a square stair leading up to the hall on the first floor. The most likely place for the kitchen will have been in the heel of the main building.

Towie was an ancient property of the Forbeses,¹ and this branch of the family have obtained historical notoriety through the dreadful tragedy of November 1571, so touchingly commemorated in the beautiful ballad of *Edom o' Gordon*. But the scene of that catastrophe, as I have already shown in these *Proceedings*, was not Towie but Corgarff; and in any case, until 1618 the capital messuage of the barony of Towie was not here but at Nether Towie, a mile to the south-west.² The present castle will therefore have been built subsequent to 1618, and with this date its architectural features—the elongated L-plan, the thinness of the walls, and the style of the corbelling—are in full agreement. According to a writer of 1797,³ the castle was never finished. "It broke three lairds in rearing up what of it now remains: and the three different kinds of work are visible to this day." No trace of this alleged threefold masonry can now be seen: but the state of the remains, which have not materially changed since James Giles made his drawing in 1841, is not inconsistent with the idea of an uncompleted undertaking. Whether this be so or not, the ruins form a characteristic and interesting specimen of the latest phase in Scottish baronial architecture.

The plan reproduced herewith is based on that made by the late Dr David MacGibbon, half a century ago, when the building was more entire. I have revised his survey and added a plan of the first floor of the tower.

Towie Castle now belongs to Captain Hugh P. Lumsden of Clova.

¹ See A. and H. Taylor, *The House of Forbes*, pp. 438-9.

² See *Proceedings*, vol. lxi. pp. 86-95. At Nether Towie there lies, on the edge of a garden patch overhanging the ruined mill, a fragment of a window lintel or sole wrought in Kildrumny freestone, with vertical tooling and a 3-inch chanfer, carefully mitred at the reprise of the jamb. It looks like sixteenth-century work.

³ *Don, a Poem*, ed. 1905, pp. 7-8.

VI.

SCOTTISH MICRO-BURINS. BY A. D. LACAILLE, F.S.A. SCOT.

Read February 28, 1942.

I. INTRODUCTION.

The so-called micro-burin, first glimpsed in 1871¹ and clearly described by Chierici² in 1875, has been made the subject of many papers, notably in the decades immediately preceding and following the last war and from the pens of Breuil, Siret, and Lequeux. In Scotland the artifact was first recognized twenty years ago.³ In 1935 I⁴ added new specimens to the list and can now establish its distribution still more fully. In my paper to this Society on "Scottish Gravers," in 1938,⁵ I reserved micro-burins for separate discussion, being convinced that they could not be considered in the same category as true gravers. Actually their use and cultural connexions have been the subject of much controversy. In space they are diffused from North Africa, Egypt, and Palestine to Central Europe, the Baltic lands, and Scotland. In time, an Upper Palæolithic Age has been claimed⁶ for some examples, though this is not proved. The type was certainly current over a long period on the Continent; and in Scotland, though known mostly from surface-finds, they come down to the Bronze Age. Still, outside Scotland, it is in purely Mesolithic industries that micro-burins are to be expected.

It has been noted that micro-burins are common in microlithic industries that do not comprise the most advanced geometric forms, such as trapezes. Hitherto this seemed to hold good of Scotland too, for the only site here, Shewalton Moor, Ayrshire, from which trapezes have been recovered, has yielded no micro-burins. On the contrary, on Deeside, at Ballantrae, and in the Tweed valley, trapezes are unknown, but micro-burins common. So, too, Deeside and Ballantrae show a higher proportion of micro-burins than does the valley of the Tweed, while in the latter area good geometric shapes are commoner than in the first two regions. Still, in the Tweedside industries many artifacts testify to the vogue of the micro-burin technique, applied even in materials less tractable than flint, and two micro-burins are known from the Culbin Sands.

I now find it difficult to believe that the micro-burin can really be absent

¹ C. Rosa, *Ricerche d'archeologia preistorica*. . . .

² *Bull. Paléont. Ital.*, i. ia. pp. 2, 17, 141.

³ H. Breuil, *Proc. Soc. Ant. Scot.*, lvi. p. 265.

⁴ *Proc. Soc. Ant. Scot.*, lxi. pp. 443-5.

⁵ *Ibid.*, lxxii. p. 184.

⁶ *E.g.*, J.-F. Pérol, *De l'industrie microlithique de Lacan* . . . , Brive, 1935, pp. 1-16; cf. p. 117 below.

from Shewalton and incline to attribute the absence of specimens from available collections to chance.

As the collections from the Scottish sites mentioned consist mainly of surface-finds in the strictest sense, it is thought that there can be little disparity in age between them. In general, their chronological position is not strictly definable, but those from the so-called 25-foot beach at Campbeltown, described in *Proceedings*, 1940-41 (pp. 70-3), can be referred on geological grounds to the Atlantic climatic phase. The industry from shore sites there, occupied during the early post-glacial marine transgression, provides, not only the oldest examples of Scottish microliths and micro-burins, but also the earliest incontrovertible evidence for the presence of man in that part of Scotland. Moreover, Breuil identified a micro-burin among flints from a shell-mound at Oronsay,¹ resting upon the equivalent raised beach. Finally, a micro-burin is said to have been picked up on the surface of the 25-foot beach near Stranraer.²

Typology.—Before considering the production of the micro-burin we may mention here that a typical specimen consists of the butt or bulbar end of a small flake notched in the upper part, usually on the right side of the obverse or flake-scarred face. The bulbar face, or reverse, exhibits a small triangular facet or scar—actually an undercut fracture—extending from the plane of this face to the side of the flake opposite the notch, *e.g.* fig. 3, No. 2, from Campbeltown, No. 4 from Ballantrae, Nos. 3, 5-8 from Banchory, notched on the right; fig. 3, Nos. 9-10 from Ballantrae and Dryburgh respectively, notched on the left.

Some micro-burins are made on the upper ends of flakes, and their significance is explained on p. 108. Only a few can be recorded from Scottish sites, mainly specimens noticed in the late Rev. Dr Wm. Edgar's Ballantrae collection, *e.g.* fig. 3, Nos. 11 and 12.

Many inquirers have interpreted the characteristic small scar as a graver-facet because its intersection with the extremity of the notch on the opposite face resembles a narrow chisel-edge often appearing as if at the end of an offset beak. Some of those who see a tool type in the micro-burin insist that the small facet varies in respect of the angle it makes with the long axis of the flake. Hence, micro-burins have been classed with gravers of the category known to French prehistorians as *burins-sur-lames-appointées*, or as transverse gravers. Other archaeologists consider micro-burins to be awls, but, while holding different opinions as to the destination of the artifacts, the two schools agree that micro-burins are peculiar to Tardenoisian culture (*cf.* p. 116). Yet, even if we admit that some micro-

¹ Sir George Macdonald, *Prehistoric Scotland* (typescript, p. 49), suggests the possibility that this specimen really belongs to the Campbeltown group recovered by Gray (*Proc. Soc. Ant. Scot.*, xxviii, pp. 270 ff.). This is not very important since I have now identified micro-burins from Risga and other kitchen-middens referable to the same culture.

² V. G. Childe, *The Prehistory of Scotland*, p. 20.

burins were used, whether provided with a handle or not, then we must also confess that the very delicate extremities necessarily restricted their use. In any case, it seems unlikely that micro-burins could have served as gravers (*burins*). Their slightness is at once obvious when they are placed alongside small graver forms from our microlithic industries. The comparison stands out well in fig. 3, showing typical micro-burins and a small laterally hollowed angle-graver of green chert from Dryburgh (fig. 3, No. 1).

Though never overlooking the possibility that some micro-burins may have been employed, the writer would say that such injury as he has detected in the sharp ends of Scottish specimens always bear the indications of a blow and not of wear.

II. TECHNOLOGY.

A.—Parts of the sketches figured in Dr J. G. D. Clark's ¹ summary of Siret's and Lequaux's theory of the micro-burin are reproduced in fig. 2. They have been cited because of their clarity, but, for reasons stated below, certain indications in Clark's group have been omitted in this work. It is hoped that the included illustrations, and those of different artifacts, as well as the brief descriptions which follow, are intelligible enough to make long comments unnecessary. M. Ed. Vignard's ² painstaking and detailed treatise on the typology and technical features of micro-burins from Sebil, Upper Egypt, provides matter for additional figures which may also be helpful. Fortunately, the present author is able to figure actual specimens in support of the theoretical aspects dealt with by English, French, and Belgian workers.

A microlith (obliquely truncated flake) and a micro-burin from Professor Dorothy Garrod's excavations at Mount Carmel, which came into the possession of my friend the late Mr J. G. Marsden, of Acton, are illuminating (fig. 1, No. 1, 1 and 2). When these are brought together it is at once seen from the coincidence of the ridges and flake-scars on their outer faces that the two objects are the complementary parts of the same flake (fig. 1, No. 1, 3). The inverse working, however, impairs the fit on the bulbar surface, but this imperfection helps further to elucidate the manner of production of some microliths.

The representation of the Mount Carmel specimens shows how they agree with hypothetical examples included in the diagrams which refer to the manufacture of microlithic forms (fig. 2, No. 1, 1-6). Having all these before us, we think we can recapture the method by which the parent flakes were divided.

¹ *The Mesolithic Age in Britain*, pp. 97-103.

² *C. R. Congrès Préhistorique de France*, x., Nîmes-Avignon, 1931, pp. 66-106.

B.—Holding a suitable flake (fig. 2, No. 1, 1) bulbar face downward, the artisan made a notch in the side of the flake some distance above the butt (fig. 2, No. 1, 2).

The flake under treatment was then placed upon a ridged anvil (a flake, core, stone, or piece of wood), with its bulbar face upward and the bulb toward the operator. The flake was inclined downward (*i.e.* the bulb

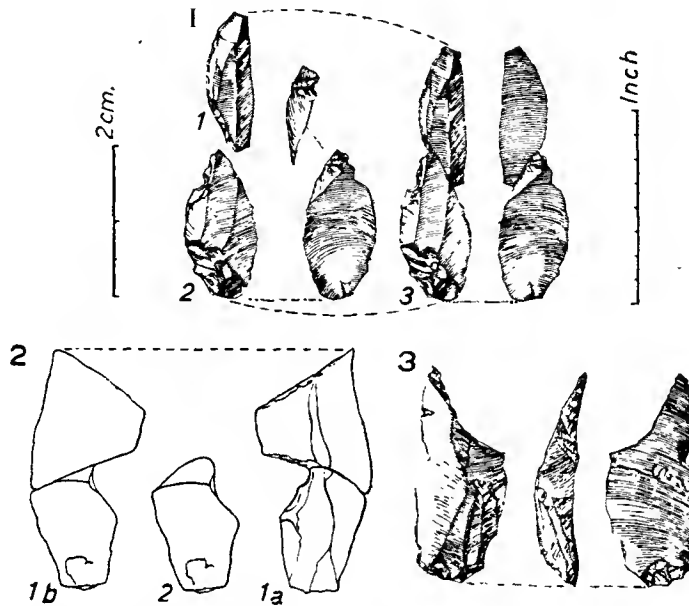


Fig. 1. The theory of micro-burin technique: No. 1, Mount Carmel, *cf.* fig. 2, No. 1; No. 2, El Gárcel (after Siret), *cf.* fig. 2, No. 2; No. 3, Dryburgh, *cf.* fig. 2, No. 3.

lower) with its long axis across the ridge and deflected to left or right according to the side in which the notch was made (fig. 2, No. 1, 3*a*, 3*b*).

With a pointed and light hammer (perhaps another flake), the knapper dealt a blow at the base of the notch. The desired place of impact is shown by a dot on the theoretical pieces sketched (fig. 2, No. 1, 3*a*, 3*b*). This operation resulted in the undercut fracture of the flake. The breaking of the flake was accompanied by an oblique positive faceting of the lower part, extending from the notch to the opposite side, with a knot or stigma (actually part of a cone of percussion) at the point of impact. Fig. 2, No. 1, 1*a* shows enlarged views of these features. On the detached upper end of the flake the point of impact is marked by a small pit (actually a hollow of percussion) accompanied by a negative facet. Fig. 2, No. 1, 1*b* shows an enlarged view of these features. A side-view (fig. 2, No. 1, 1*c*), enlarged also, is shown.

The lower part or bulbar end of the flake, now the micro-burin (fig. 2,

CORRIGENDA: VOL. LXXVI.

P. 106. *line 1. for "downward" read "upward."*

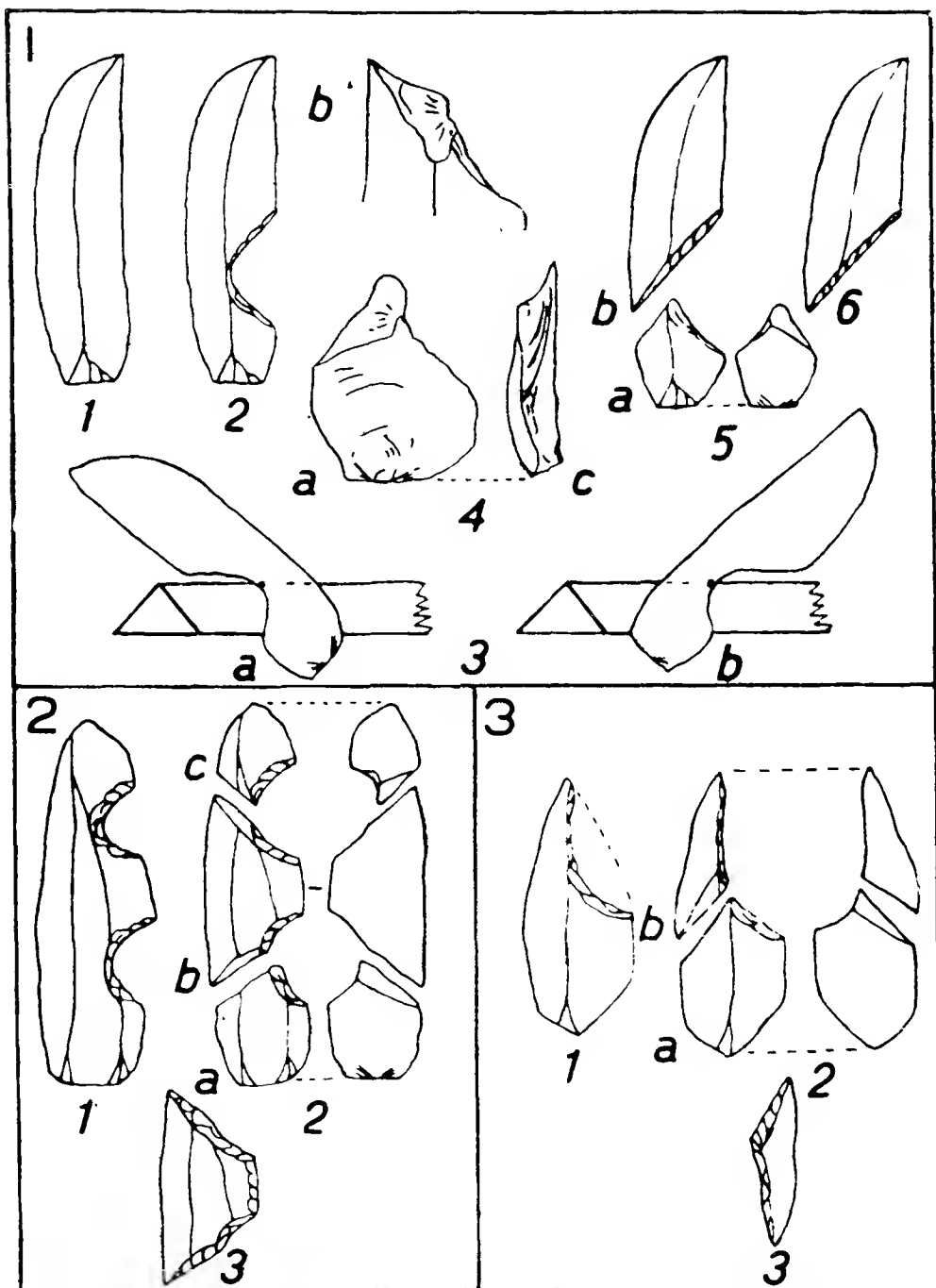


Fig. 2. The theory of micro-burin technique. (After Lequeux, Siret, Clark, and Vignard.)

No. 1. 5a), received no treatment and was discarded. The edge of the detached upper part of the flake (fig. 2. No. 1. 5b), which was involved in the first process of notching, was blunted by abrupt retouch for the length required to complete the microlith (fig. 2. No. 1. 6).

Many microlithic forms (which forms are so often fashioned in the upper ends of flakes) must have been produced by the method outlined. The prehistoric craftsman's aim in adopting the process was to remove the unwanted thick part of the flake. That micro-burin technique was not applied in the manufacture of all diminutive steep-edged artifacts appears from the occurrence of small flake-implements retaining the bulb of percussion, or from which the bulb was removed by slicing the flake at the base, or in which the bulb has been dressed down.¹

Trapezes, as one group of theoretical figures shows (fig. 2. No. 2. 1-3), and other advanced geometric shapes could be produced in the manner described by first forming suitably spaced lateral notches in a flake (fig. 2. No. 2. 1), and applying the necessary retouch to the middle portion removed. In the manufacture of some of these, particularly trapezes, two micro-burins would result from the division of the flake. Fig. 2. No. 2. 2 shows the whole group, comprising fig. 2. No. 2. 2a the lower micro-burin, fig. 2. No. 2. 2b the required piece of material, and fig. 2. No. 2. 2c the micro-burin on the flake-tip. The author, although unable as yet to figure three actual complementary parts of the one flake (*i.e.* trapeze or other geometric form with its two concomitant micro-burins), can yet illustrate a trapeze and its lower or bulbar micro-burin (fig. 1. No. 2. 1a, 1b, and 2) found by Siret² at El Gárcel, Almería. The sketches show that, while the ridges and flake-scars on the outer face (fig. 1. No. 2. 1a) agree, a slight disparity, due to inverse marginal retouch, appears on the bulbar face (fig. 1. No. 2. 1b), as is the case in the pair from Mount Carmel, *supra* (fig. 1. No. 1). The bulbar face of the Spanish micro-burin, isolated from the trapeze, is represented by fig. 1. No. 2. 2.

So far, the Scottish sites which have yielded micro-burins on flake-tips have given no trapezes. The explanation of these rare micro-burins would therefore lie in such geometric shapes as triangles, whose manufacture called for portions of material determined by two notches formed in the parent flake before division.

The merits of the method of cutting flakes by micro-burin technique are apparent, because, in addition to getting rid of unsuitable material, the notching, by reducing the width of the flake, facilitated fracture at a pre-

¹ The micro-burin technique has not yet been observed in Orkney where we find small flints, trimmed in microlithic style on complete flakes (*Proc. Soc. Ant. Scot.*, lxi, pp. 251-62). In this respect they resemble some stone industries from Ireland whence the micro-burin has not been reported up to date (*cf.*, *e.g.*, *Ulster Journal of Archaeology*, 1938, i, pp. 90-1). Such pieces are made in the tradition of the Upper Palæolithic abruptly retouched, narrow flake-tools.

² *Revue Anthropologique*, 1924, pp. 121-2, fig. 4.

determined point of least resistance. In the preparation of certain forms it allowed the operator to fix in advance the principal dimensions of the desired artifact.

From the foregoing it seems clear that in the micro-burin and concomitant microlith from Mount Carmel the characteristic transverse facets result from a blow delivered whilst the parent flake was held upon an anvil. One may even go further and assert that scrutiny of all true micro-burins, and experiments in flint-working according to the procedure described in the foregoing confirm the claim that the typical features could not have been produced otherwise.

Readers may have perceived that the mode of production outlined above diverges from that suggested by Lequeux's sketches reproduced by Clark. In these an arrow indicates the supposed direction of the blow intended to divide the notched flake: but, having given every consideration to the matter, the author ventures to point out that if the process (Lequeux's) were followed it would be necessary for the operator to hold the flake under treatment in the hand by the end (butt or tip according to the position of the notch), and the large portion would have to be struck off as a flake. Further, the method suggested by the directional arrow would not account for the fact that the knot or stigma of percussion occurs so often some little distance from the edge of the notch. Siret and Vignard are much nearer the truth in their deductions, as indeed we have been able to confirm from others' and our own experiments.

C.—An examination of the features evident on the two specimens from Palestine suggests certain further considerations. For example, had the blow, intended to divide the parent flake, not fallen accurately, the resulting facet would diverge somewhat from the standard present in the perfect type. In this connexion it may be observed that many small artifacts, although suggestive, are yet so scarred that at first sight it seems difficult to assign them to their proper place. Closer examination of their dominant traits, however, may show that the objects are the unsuccessful results of applying the specialized technique outlined above and that they belong to the same category of prehistoric products as micro-burins, namely, the by-products of microlith manufacture. Such specimens in flint are probably not more numerous in Scotland than elsewhere, but in the Tweed valley, where green chert served extensively in the production of microliths, the proportion of micro-burins and waste bearing aberrant features is decidedly high. Chert in this region varies greatly in point of tractability, and, to judge from artifacts worked in it, this rock seems not always to have been obedient to micro-burin technique.

The characteristic micro-burin facets may be noticed to differ slightly even in typical specimens bearing the signs of accurate division of the flake. This peculiarity can only be put down to the accident of fracture, due

perhaps to the properties of the rock or to unconscious variation in striking. Thus, the force of the blow upon the base of the notch could not always be uniform, and considering the hammers probably used and the small size of the piece under treatment, it could hardly be expected that the blow should inevitably fall with absolute precision. Besides, so delicate are the flakes operated upon that even slight variations seem exaggerated. Indeed, it is more surprising to find that there exists such uniformity in the principal traits of micro-burins, a fact which testifies to consistently accurate division of flakes. Hence, so closely do most of our micro-burins resemble each other that the reproduction here of but a few specimens from any one rich locality would suffice for a technical review. However, to support this assertion, examples, representative of our principal microlithic industries from more than one district, are illustrated in fig. 3.

The Deeside, Tweed valley, and Ballantrae microlithic series, which do not include trapezes, comprise such numbers of micro-burins as to show that the technique described above was much in vogue. The actual variety of micro-burins, however, is seen to be limited, as already stated. But, for the purpose of demonstration, a few variants, which now call for brief mention, may be shown as well as representatives of the standard. All examples referred to, and, no doubt, those to be discussed, may be taken as characteristic of the known Scottish microlithic industries, and they are probably equally typical of what new sites will yield.

D.—Sometimes it is not easy to determine by the eye alone whether the blow fell within or close to the notch even in apparently typical specimens of micro-burins, but inspection under the lens will reveal the mark of impact with the accompanying signs of shattering and rippling. Other micro-burins, seemingly quite normal, visibly betray slight variations taking the form of evidence of blows dealt slightly to one side or the other of, or even inside, the notch. Many specimens suggest indifferent workmanship, or accidents in manufacture, but it does not follow, where there is evidence of irregular division of the flake, that the concomitant part detached was necessarily rejected as unsuitable for dressing into the microlithic form required.

A fairly common case is the small preparatively notched flake in which the undercut fracture did not resolve into a clean oblique facet, but developed into one running down the whole length of the side of the flake. Such instances suggest use of faulty rock, in which the vibration set up in the piece under treatment by a blow, perhaps too vigorous, would cause the flake to fracture across its long axis with accompanying lateral downward splitting. Examples, found near Birkwood, Banchory, show this accidental fracture-feature (fig. 3, Nos. 13, 14).

It may be that the anvil played a part in fracturing flakes under treatment by micro-burin technique. Thus, if a flake were held down too lightly and a rather heavy hammer were used, the flake upon being struck would

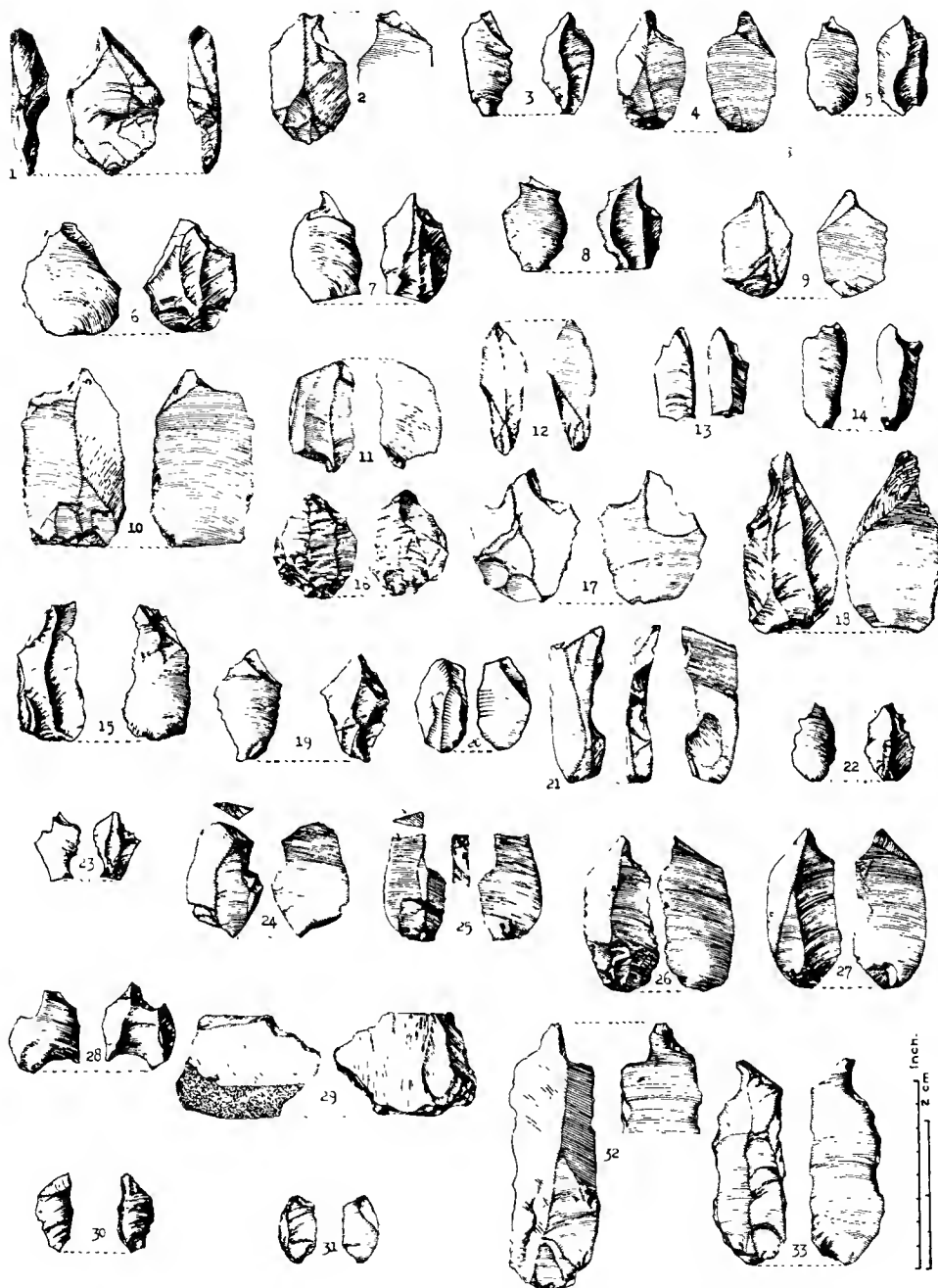


Fig. 3. From Scottish sites: No. 1, Angle-graver (for comparison); Nos. 2-20, 26-28 and 31, Micro-burins (13-18, faulty fractures); Nos. 21-25, Notched flakes (22-23, breaks; 24-25, miss-hits); No. 29, Flake, apparently divided by micro-burin technique; No. 30, Broken microlith (for comparison); Nos. 32-33, Awls (for comparison).

possibly respond to the reaction of the anvil. In such a case the knot of percussion might occur on the ridged and flake-scarred face held down upon the anvil, exactly as takes place in the English gun-flint, *postea*, p. 116. No Scottish specimen has yet been noted to bear incontrovertible indications of this treatment, unless a notchless micro-burin in the late Rev. Dr Wm. Edgar's collection provides an instance (fig. 3, No. 15). The deep hollow of percussion appearing near its tip and within the narrow facet may result from a direct blow upon the ridged face. The now vanished concomitant part of the flake would, of course, when detached bear the stigma or knot of percussion. Vignard, however, claims and figures specimens.

It may be inferred from the foregoing that the marks of impact are of significance in a study of the technical aspects of micro-burins. Therefore, it is regrettable that illustrations of these small artifacts so rarely indicate the true character of their fracture-features as evidenced by the modifications in the facets and other traits. Hoping that this paper may attract attention to a form hitherto little regarded in Scotland, we have attempted to give an idea of the nature of the different features.

E.—Siret has recorded a type of micro-burin from El Gárcel, the prepared lateral hollow of which comprises a double notch.¹ In this variant the scar is much wider and generally longer than in the usual form. Very similar objects may also result from an ill-directed blow, which enlarged an ordinary notch and simultaneously gave rise to a wide spreading scar instead of causing a normal narrow undercut fracture with short facet. A chert example (fig. 3, No. 16) from Dryburgh, and one of flint (fig. 3, No. 17) from the Albyn Distillery, Campbeltown, raised beach industry, compare with Siret's. In these Scottish micro-burins, both of which are made in rather poor materials, there is slight scaling with consequent wide spreading of the shallow scar. A Deeside example (fig. 3, No. 18), struck in a good buff flint, most closely resembles Siret's type-specimen. In respect of the nature of the fracture all these may be compared with the laterally faceted examples (fig. 3, Nos. 13, 14) from Banchory.²

F.—Of other variants, those Scottish instances apparently unprovided with artificial lateral notching (Fr. *langue d'aspic*) are remarkable, because, considering what has been said on the production of micro-burins, it may seem contradictory to suggest that the delicate oblique facet could have resulted unless a hollow had been made in the side of a flake before division. Inspection will usually show, however, that advantage was taken of a convenient lateral nick which adequately reduced the width of the flake, and it was near the base of this hollow that the craftsman struck. The Ballantrae and Banchory collections furnish us with examples, one from the latter locality being figured (fig. 3, No. 19).

¹ *Op. cit.*, p. 44; *cf.* also Ed. Vignard, *C.R.C.P.F.*, x, p. 84.

² *Cf.* Vignard's "éclatement vibratoire," *loc. cit.*, p. 82, and pl. viii, 6.

There also occur kindred small objects, which, though faceted obliquely across their upper ends, yet exhibit no signs of adventitious or intentional notching. These pieces are scarce everywhere, but a list can be made of Scottish specimens, Deeside and Ballantrae yielding a few. Technically this notchless variety, which was probably produced in making very narrow microlithic forms, belongs to the micro-burin class. Fig. 3, No. 20, from Banehory, immediately proclaims this identity. While interesting as a modification of the normal sort, it is a link with English gun-flints and ought to be studied in conjunction with them (p. 116).

III. NOTCHED FLAKES.

Writers, commenting on the microlithic element in our principal British collections, have mentioned notched flakes agreeing in size with the general run of diminutive primary flakes and treated artifacts with which they occur. So far as concerns our Scottish industries there is a call for further notice of these objects. Actually, the notched flakes belonging to our microlithic industries may be sorted into groups. Many notched flakes, intact or broken in different ways, must be considered on the score of the working along the edge of the hollow, not as tool-forms (*e.g.* side-hollow-scrapers or spokeshaves), but as pieces which were involved in the early stages of preparing microliths by micro-burin technique.

In the first category may be ranged small flakes which were provided with the essential notch prior to division, and which for some reason received no further treatment, *e.g.* No. 21 in fig. 3 from Deeside. It seems that the size of these is such that they cannot be regarded as tools, but as treated primary material considered in the foregoing section (fig. 2, No. 1, 2, 3*a*, 3*b*, *supra*, p. 106).

Next in this list are those flakes which fractured across under the process of notching. In these cases the surface of the fracture is not oblique but more or less at right angles to the flake surfaces. Also, no marks of percussion are discernible on such objects as merely snapped under treatment. Two specimens (fig. 3, Nos. 22, 23) of flint from Miss Paterson's Deeside collection are representative.

From conversations with M. Ed. Vignard, who has figured and discussed examples from Sebil, personal experiments and observation, I have come to the conclusion that numbers of small fractured notched flakes owe their condition to misdirection of the blow intended to cut them. Consequently, many specimens, picked up at our sites near Ballantrae and in the valleys of the Dee and Tweed, must be regarded as failures of the second stage of the preparation of microliths by micro-burin technique, and not tool-forms damaged in the course of usage. When complete these broken notched flakes

doubtless conformed to the ideal specimen (fig. 2, No. 1, 2), and fulfilled all the requirements necessary for the manufacture of artifacts by the process described. In typical examples of miss-hits the fracture generally takes the form of a truncation immediately above the notch, which is not oblique and is more or less at right angles to the long axis of the flake, *e.g.* fig. 3, Nos. 24, 25, from Dryburgh. Some specimens, however, also split downward from the truncation. This fault appears in objects from all our sites, for it seems to have been a common accident due probably to incorrect placing of the flake on the anvil or to movement thereon during the operation. If the edge of the truncation be closely scrutinized it will usually be found to bear some indication to show where the hammer fell.

IV. EMPLOYMENT OF MICRO-BURINS.

A.—Granting that some micro-burins may have been employed as tools, it is nevertheless difficult to imagine to what use such small and fragile objects could be put, unless a suggestion as to one possibility made by Messrs D. Peyrony and H. V. V. Noone be tenable. According to them, the artifacts, whose beak-like tips are not adapted to chiselling but conceivably to fine cutting, might have served as parts of composite implements, *e.g.* barbs of weapons.¹ Even so, such artifact evidence as the author has examined points to micro-burins as none other than by-products. Still, the complementary parts of some micro-burins must have been so small as to seem to many inquirers explicable only as waste. Vignard holds that in such cases the micro-burins (obviously more manageable than their concomitants) were really the products wanted and that they were made for employment. His conjecture, however, does not seem wholly convincing when one examines the artifact evidence. Our Scottish series, which include the tiniest dressed forms, certainly do not lack extremely small micro-burins, numbers measuring less than 1 cm. in length. The present author, therefore, prefers to think that many of the diminutive microlithic forms—not necessarily geometric—were almost entirely fashioned in the flake before division, *e.g.* fig. 1, No. 3, referred to in the next subsection. However, in fairness to Vignard, two specimens from the Culbin Sands, Moray (fig. 3, Nos. 26 and 27),² and formerly in the Lewis Abbott Collection, are figured as micro-burins of the type believed by Vignard to have been manufactured for its own sake. A micro-burin from Birkwood, Banchory, is also represented (fig. 3, No. 28) as one comparing closely with specimens similarly referred by Vignard to this order.³

¹ *Bull. Soc. Préhist. Franç.*, xxxv. (1928) pp. 108-10.

² These examples seem to be the only evidence that a microlithic industry once flourished in this area so prolific in finds of later periods.

³ *C.R.C.P.F.*, x. pp. 88-90, and pl. xii, Nos. 20 and 21.

B.—Though we have no reason to think of any Scottish micro-burin as an artifact produced for itself, a specimen may, however, be mentioned as an exact counterpart of objects in which one school sees the deliberate intention of the craftsman to manufacture micro-burins. We understand that the microlithic industry from the rock-shelter of Lalla-Marnia, Algeria, although poor in trapezes, has proved rich in equally represented micro-burins and triangular flakes, the last-named with one battered edge and a triangular facet at the base. From these indications Lequeux infers that the micro-burin, and not the small flake, was the wanted object. Clark, deducing how micro-burins were made at the Algerian station, quotes Lequeux's statistics to show that relatively few of the triangular flakes are worn and that the majority of the micro-burins appear to have been used.¹ Consequently, when viewed from a technical angle, the drawing of a specimen from Dryburgh (fig. 1, No. 3), which cannot so far be matched from this or other Scottish locality, excites interest if compared with the example figured and considered with Clark's theoretical specimen based on Lequeux's findings (fig. 2, No. 3, 1-3). Failing other evidence, it is thought, the tapering upper part of our piece with its steeply worked edge suggests an unfinished microlithic form: if manufacture were completed (and the flake were divided by a blow dealt at the spot where the straight battered edge merges into the transverse one), the features of a micro-burin would certainly result. Moreover, the very careful treatment expended on the edge of the upper part of this flake cannot be regarded as a stage in the making of a micro-burin as a primary product. Instead, we appear to be faced with a small microlith in the making, and one of the sort hinted at in the preceding paragraph. In this connexion the example is a useful addition to our series, and if others like it are eventually discovered they will be further testimony to the adoption of different methods in the production of small forms by the application of the principles of micro-burin technique.

V. MATERIALS.

Flint and chert examples have up till now been noted in the foregoing paragraphs; but, where it was practised, micro-burin technique was probably exercised with other rocks if we take as an example a small flake of quartz (fig. 3, No. 29) recovered by excavation in the 25-foot raised beach near the Albyn Distillery, Campbeltown. This flake appears to have been notched preparatively to ensure accurate division, and, as it belongs to an Early Mesolithic industry which comprises microliths and micro-burins, it is suggestive enough to be included among specimens illustrated.

¹ *The Mesolithic Age in Britain*, pp. 99-100.

VI. ASPECTS OF THE ENGLISH GUN-FLINT INDUSTRY AS RELATED TO MICRO-BURIN TECHNIQUE.

The explanation of the micro-burin as the result of a method of making microliths advanced above is due not only to examination of prehistoric artifacts and theoretical deductions, but also to experiments conducted by M. Vignard and by the author himself. The fast-dying English gun-flint industry further provides valuable corroboration. As expounded by Knowles and Barnes¹ the procedure adopted by the surviving exponents of the old craft at Brandon in dividing flakes into sections might indeed possibly be regarded as a reminiscence of the highly specialized technique that yielded micro-burins. The undercut fracture forming the "sides" of an English gun-flint corresponds to the transverse facet of the micro-burin and exhibits a similar knot of percussion or its corresponding negative. This is, however, produced by the reaction of the anvil, the reverse of what happened in micro-burin technique. Moreover, the fracture lies at right angles to the long axis of the original flake, but an oblique fracture, reproducing more closely the facet of a micro-burin, can be produced by the same technique as Knowles and Barnes have explained.

VII. PSEUDO MICRO-BURINS.

Without study of a great number of specimens, experimentation with siliceous rocks and an examination of the comparative ethnographic evidence, the micro-burin facet may of course give rise to many theories. Only one need be mentioned here, and that because some Scottish artifacts seem to be involved. We refer to the suggestion that micro-burins are damaged implements. Dr L. S. B. Leakey² treats several small pointed artifacts—of obsidian—from his "Upper Kenya Aurignacian" in the same category as micro-burins.

Although the African objects, many of which are steeply trimmed along one edge, bear a small oblique facet and sometimes a notch, Leakey considers them to be awls, and he thinks the facet giving the artifacts the look of micro-burins nothing but a fracture-feature due to usage. Moreover, as these small pointed and faceted forms are so common in microlithic industries he believes they must be broken tools. While the present author agrees with those who consider that most of the Kenya examples are not acceptable as micro-burins,³ he recalls that at sites yielding microliths there occasionally occur small pointed implements with an oblique facet on

¹ *Antiquity*, 1937, pp. 201-7.

² *The Stone Age Cultures of Kenya Colony*, pp. 101-2, 242.

³ A. C. Blanc has identified some true micro-burins in Leakey's series. *Bull. Soc. Préhist. Franç.*, xxxvi. (1939), p. 129, fn.

the bulbar face due to breakage, probably through service. Inspection of this trait on such objects will show how sensibly it differs from the facet caused by a blow, which invariably leaves indications testifying to the application of micro-burin technique.

Our own collections provide some steeply dressed examples with a facet probably resulting from excessive stress brought to bear upon the implement. A flint specimen (fig. 3, No. 30) from Miss Paterson's Deeside series is unmistakably a broken microlith. The small scar at its upper end, though not unlike one due to a blow, yet shows no marks of percussion; nevertheless, the accidentally produced facet exhibits the characteristics of the conchoidal fracture of flint. In respect of this and other rocks having similar properties, it may be said that a fracture-feature, such as a facet whether accidentally or intentionally produced, occurring in very frail diminutive objects, must often at a first glance appear indistinguishable. The difference, however, may be detected between the facet of the Banchory specimen (fig. 3, No. 30) and that characterizing a small notchless micro-burin from Ballantrae (fig. 3, No. 31).

Again, a pronounced facet borne by some small pieces, which may suggest a micro-burin scar, will prove upon inspection to form a sort of hinge in negative. Such a feature probably indicates a fracture due to the exerting of too much pressure upon a finely pointed tool used with a twisting movement.

Some narrow specimens terminate in a deceptive sort of beak. In many cases these are true micro-burins, but in others various reasons may account for the small oblique facet appearing on the bulbar face. The exact character of the scar ought, however, to be determinable by seeking for the mark of impact which rarely fails to leave unmistakable signs. Yet, an example now brought to notice might conceivably be classed as a micro-burin. Actually, however, the figured artifact from Dryburgh (fig. 3, No. 32) is an awl of green chert, the tiny flake-scar at its tip on the bulbar face being due to the removal of too large a squill in the course of the fashioning of the delicate narrow point. To make this explanation clear a perfect specimen of the same rock and from the same locality, but with staggered working-point, is figured with its damaged companion (fig. 3, No. 33).

VIII. ORIGIN AND SURVIVAL OF MICRO-BURIN TECHNIQUE.

It has already been mentioned that micro-burin technique is claimed to have a place at Lacam, Brive-la-Gaillarde (Corrèze), among the crafts of folk living in the third stage of Magdalenian culture.¹ Though this claim is not generally accepted, the micro-burin does appear early at some French

¹ Cf. p. 103, note. M. Pérol regards the micro-burins found stratified at Lacam as tools, not as waste.

sites. In the south-western *départements* and elsewhere it has been noticed among products (Sauveterrian) from a horizon intercalated between a late Magdalenian and an early Tardenoisian level.¹ Vignard² makes a good case for assigning the inception of this style of working to the improvement of striking-platforms of flake-implements of Levalloisian facies referable to his second level at Sebil, Upper Egypt. In point of chronology he would equate the culture represented with the initial phases of the Aurignacian. His third level at Sebil yields a rich industry in which ample evidence of the development of micro-burin technique is furnished by advanced geometric and other forms. The technique believed by this archæologist to have been cradled at Sebil thence became widespread. He would trace the wanderings and influence of its exponents by the constant appearance of the micro-burin in unchanging fundamental form, a fact proclaiming identity of method of production at all sites.

While Vignard's distribution from a site in Upper Egypt may be disputed, the common ancestry of microlithic industries can hardly be doubted. In this respect it will be recalled that many years ago Breuil³ expressed the opinion, since so often quoted, that the diffusion of the micro-burin, which provides the essential link, indicates a migratory movement from a common point situated in the Mediterranean basin.⁴

The significance of the micro-burin also lies in its being expressive of great ingenuity in working stone for the needs of peoples living under certain cultural conditions. On the strength of the evidence afforded by excavations we have reason to believe that by the Late Boreal climatic period micro-burin technique was well established in English Mesolithic industries.⁵ That it had penetrated as far as Scotland by relatively Early Atlantic times is proved by the occurrence of micro-burins, and microliths fashioned from the upper part of flakes, recovered from the Argyll 25-foot raised beach deposits. The presence of these artifacts among others indicates that the primordial settlers on our shores possessed a well-developed culture. That the method long persisted in prehistoric Scotland and England appears from the numbers of surface-found micro-burins and microliths. Micro-burin technique, preserved in the South by stone craftsmen of the early Metal Ages,⁶ must eventually have been acquired by the first English commercial flint-knappers, who, while retaining its

¹ *Archives de l'Institut de Paléontologie Humaine*, Mémoire 14, pp. 12-17.

² *C.R.C.P.F.*, x, pp. 102-3.

³ *L'Anthropologie*, xxxi, p. 351; *Les Subdivisions du Paléolithique Supérieur*, 2nd edit., p. 73.

⁴ Blanc reports (*op. cit.*, pp. 122-31) micro-burins in an industry associated with a glacial fauna at La Grotta Romanelli, Otranto.

⁵ *Antiquaries' Journal*, xv, (1935) pp. 284-319.

⁶ M. Siret was convinced that the sections of flint, from which triangular, hollow-based and even barbed arrow-heads were made in the Copper Age of Almeria and Granada, were obtained by dividing the blades by the micro-burin technique.—*Rev. Anthr.*, 1924, pp. 132-3. This would not really be surprising and evidence might be looked for in British forms resembling the Spanish.

strict principle, slightly modified actual practice. The last of the artisans at Brandon, who in effect now carry on so ancient a tradition, will probably witness its extinction.

IX. ACKNOWLEDGMENTS.

The author wishes to record that in the preparation of this paper he has had the valued help of several friends. His warm thanks go first to our Fellows Miss Hilda M. Leslie Paterson, Banchoory, and Dr W. A. Munro, Edinburgh, both of whom with their customary generosity so freely placed their collections at the writer's disposal. To Miss J. H. M. Cullen, Glasgow, he is grateful for giving him access to the series which her late brother-in-law, Rev. Dr Wm. Edgar, assembled from Ballantrae. The advice and interest of Professor A. S. Barnes, London, and M. Ed. Vignard, Paris, are acknowledged with gratitude.

APPENDIX.

Since these notes were written, a grant awarded me by the Trustees of the Leverhulme Research Fellowships, whom I thank, permitted me last summer to extend my inquiries in our Mesolithic field. The results of these investigations will be duly reported, but I may say now that inspection of several collections of stone implements revealed a number of micro-burins. Of those which may be mentioned meantime are a flake-tip example from Risga, Argyll, preserved in the Hunterian Museum, Glasgow University, and a butt-end specimen from the Tentsmuir Sands, Fife, in the University Museum, St Andrews.

VII.

A ROMAN OVEN AT MUMRILLS, FALKIRK. BY MISS ANNE S. ROBERTSON, M.A., F.S.A.Scot.

Read March 28, 1942.

In April 1941 the remains of a Roman oven were found within the area occupied both by the Agricolan fort at Mumrills and by the Annexe to the later Antonine fort. These remains lay partly on land sublet to Messrs Young, of Oaklands, Laurieston, and partly on ground sublet to Mr Robert W. Howie, of Highbank, Laurieston. Their presence was first detected by the latter's son, Mr Forbes Howie, and was at once reported to Mr Samuel Smith, tenant of Mumrills. After completely uncovering the remains, Mr Smith identified them as those of a Roman oven, and

communicated with Dr A. O. Curle and myself. At the request of Dr Curle and Mr Smith I undertook the task of recording the discovery. In doing so, however, I wish to acknowledge Mr Smith's constant help in the work of photographing and drawing the remains, and in supplying certain essential information.

Thanks are also due to Mr Robert Howie for his interest and forbearance, and to Professor Trueman, of the Geology Department, Glasgow University,

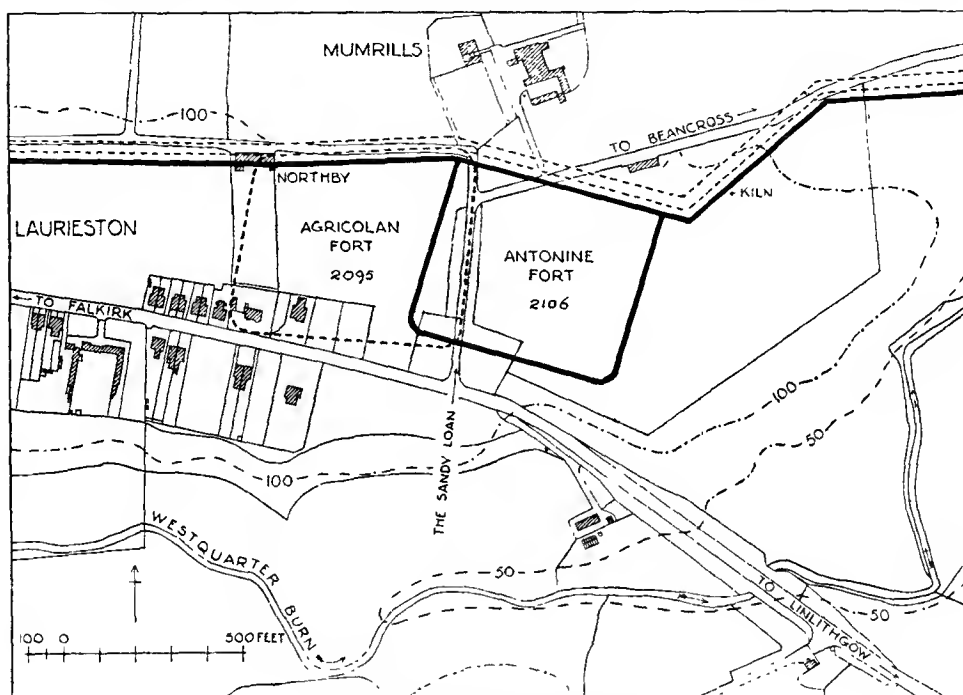


Fig. 1. Map of the Site of Mumrills Fort.

to Dr Smythe, of King's College, Newcastle-on-Tyne, and to Mr Charles Taylor, of Castlecary, for technical advice of various kinds.

The remains of the oven were found at a depth of 6 to 9 inches below present ground level, under the fence bounding field 2095 on the west and 76 feet from its southern end (fig. 1). The oven had had its main axis lying east to west, and had been roughly circular in plan. The floor measured $2\frac{1}{2}$ to 3 feet across, and the surrounding walls had an overall diameter of about 5 feet. From the western end led a flue, about $3\frac{1}{2}$ feet long by $1\frac{1}{2}$ feet wide (fig. 2, and Pl. XXIX, 1).

The floors of oven and flue were continuous, and were formed of large flagstones, about 2 inches thick, the largest being as much as $2\frac{3}{4}$ feet long. When uncovered, the walls were standing to little more than a foot in

height, that on the south side being better preserved than that on the north. They had been built of undressed stones, of various shapes and

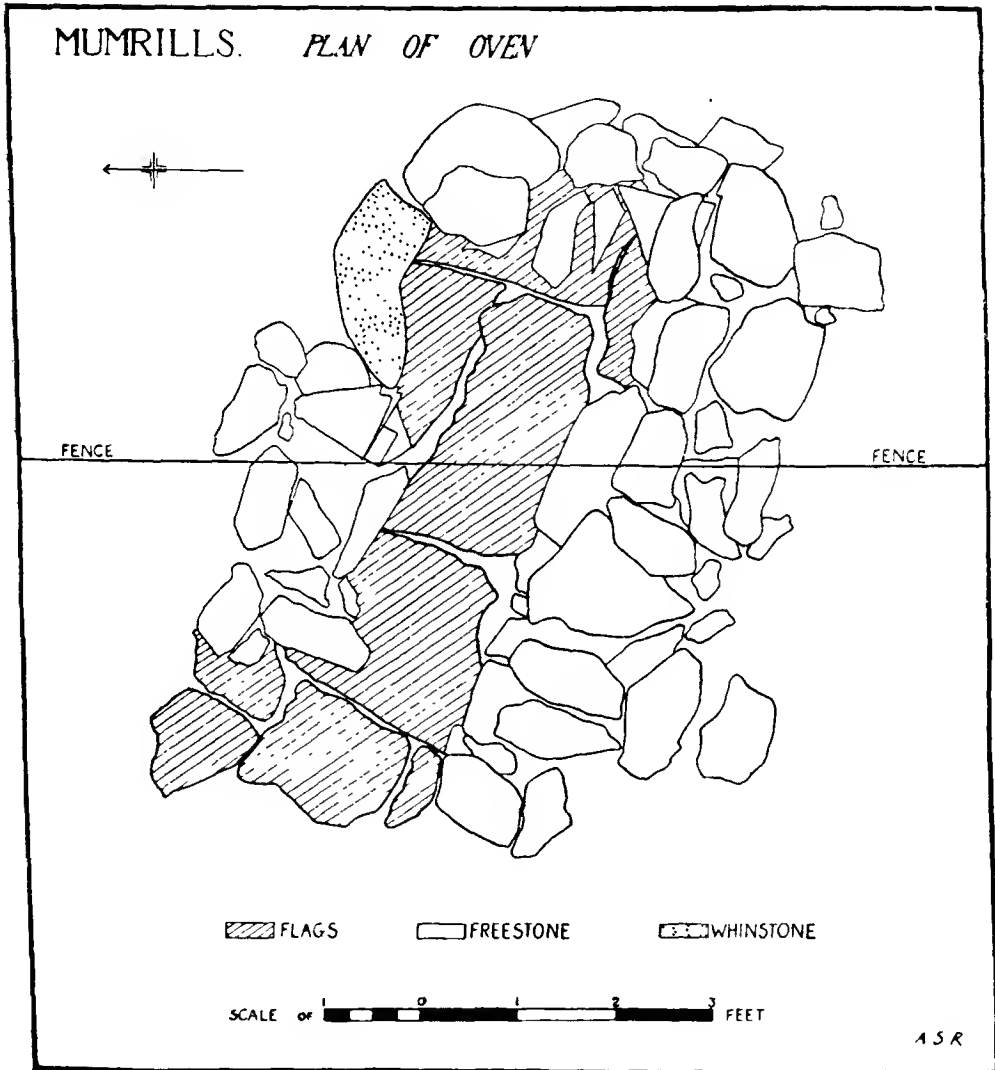


Fig. 2. Plan of Oven.

sizes, set in clay. The majority of these were freestone, with the notable exception of a whinstone boulder, 2 feet long, on the north side, whose naturally curved outline had helped to give its circular shape to the oven.

The remains of the oven walls had been no more than the foundation of a clay and rubble dome, the ruins of which were still preserved in the

form of numerous small stones lying in and around the oven, along with several lumps of clay burned red with intense heat. The dome must have been shaped rather like a bee-hive, with a hole in the top to serve as a chimney. A fire-reddened flagstone, about 1 foot square by 2 inches thick, which was found inside the oven, may have been used as a damper to cover the chimney. Signs of burning were most noticeable at the inner end of the flue, just at the point where it joined the oven.

That the flue walls, on the other hand, survived to their original height was suggested by their level top and finished appearance. The level top may have served as a hob. The north flue wall differed markedly in construction from the south flue wall and appeared to take the form of a level rectangular platform surmounted by a step or check. It was suggested by Dr A. O. Curle that this structural peculiarity may have had some connection with the heavy door which would be required to close the oven.

The north flue wall, too, stopped short of the south flue wall, possibly in order to allow ashes to be raked out into a pit at the north-west corner. A depression was in fact found at this point, but unfortunately it proved impracticable to determine its dimensions or to decide whether it was contemporary with the oven.

Samples of burned clay from the interior of the oven were examined by Professor Trueman, of Glasgow University, and, through the good offices of Mr Charles Taylor, by Mr J. F. Hyslop of the analytical staff of Messrs John G. Stein & Co. Ltd., of Castlecary. Both were agreed that the clay had not been subjected to a very high temperature, comparable, for example, with that required for smelting iron or firing bricks. The oven could only have been used for baking.

A similar conclusion was reached by Dr Smythe, of King's College, Newcastle-on-Tyne, as a result of his analysis of a piece of slag-like material which was found in a layer of burned clay inside the oven. Dr Smythe was inclined to the view that the material was furnace-clinker, formed by the burning of coal. He added that the temperature had been fairly high, though not so high as in a smelting furnace.¹

Unfortunately, the discovery of one solitary scrap of material which is possibly, but not certainly, clinker formed by the burning of coal cannot be taken to prove that coal was used in fuelling the oven. Further, no evidence for the use of coal at Mumrills in Roman times was forthcoming in the excavations carried out on the site in the years 1923 to 1927.² On the contrary, the quantity of soot found in the pillared hypocausts and the large size of their stokeholes left little doubt that they had been fuelled with wood, while the lack of discoloration in the channelled hypocausts

¹ See Appendix.

² *Proc. Soc. Ant. Scot.*, lxiii. (1929) pp. 396 ff.

and the smallness of their stokeholes suggested that they had been fuelled with charcoal.¹

The discovery of the supposed clinker in the oven, therefore, does no more than hint at the remote possibility that coal was used on occasion at Mumrills. Further evidence on this point may yet come to light, and, meanwhile, it may be noted that there is an outcrop of the Armadale Main Coal Measures on the banks of the Westquarter Burn, not more than half a mile to the south-west of the fort.² This outcrop, like so many others in Britain, may well have been exploited in Roman times. In Scotland, for example, coal has been found in the bottom of a pit or refuse hole in the Antonine fort on the Bar Hill,³ which too lay within a short distance of a coal outcrop, and also beside the granary of the fort at Castlecary.⁴ In England and Wales, evidence for the use of coal is much more abundant, especially in the forts on Hadrian's Wall, and in the villages and villas of the south-west. The former lay within easy access of the coal outcrops in the Tyne Valley and Cumberland, while the main source of supply for the latter must have been the coalfields in the Forest of Dean.⁵

The purposes for which the coal was used included the smelting of iron, as, for example, at Warrington,⁶ the smelting of lead, as at Pentre, Flintshire,⁷ and the heating of hypocausts, as at Castlesteads.⁸ Coal has also been found in ovens at Corbridge, but these may have been connected with metallurgical processes.⁹ No definite evidence for its use in firing baking-ovens seems to have been recorded, and it is generally assumed that these were fuelled with wood or, possibly, charcoal. Wood ash has been discovered in connection with ovens at Fendoch,¹⁰ Malton,¹¹ and Cawthorn,¹² and a layer of charcoal is said to have covered the oven floors at Birrens¹³ and Inchtuthil.¹⁴ Coal, however, would not be altogether unsuitable for heating an oven, especially a small oven like that at Mumrills. The disadvantage of the slow rate of combustion would be offset by the fact that a coal fire needed less constant replenishing and maintained a higher temperature than a fire of wood. Nor would the soot generated by coal

¹ *Proc. Soc. Ant. Scot.*, lxi. (1929) pp. 458 ff., 469 ff., 488 ff.

² *Geological Survey of Scotland* (2nd ed., 1899), Stirlingshire, Sheet xxx, N.E.

³ Macdonald and Park, *Roman Forts on the Bar Hill* (1906), p. 62.

⁴ *Proc. Soc. Ant. Scot.*, xxxvii. (1903) p. 313.

⁵ For the whole question of the use of coal in Roman Britain see R. G. Collingwood in *An Economic Survey of Ancient Rome*, iii. (1937) pp. 35-37.

⁶ Thomas May, *Warrington's Roman Remains* (1904), pp. 29 ff.

⁷ *Archæologia Cambrensis*, 1856, p. 306.

⁸ Hutchinson, *Hist. of Cumberland*, i. p. 111.

⁹ Information from Mr Ian Richmond.

¹⁰ *Proc. Soc. Ant. Scot.*, lxxiii. (1939) p. 137.

¹¹ P. Corder, *The Defences of the Roman Fort at Malton* (1930), p. 17.

¹² *Archæological Journal*, lxxxix. (1932) p. 36.

¹³ *Proc. Soc. Ant. Scot.*, xxx. (1896) p. 101.

¹⁴ *Proc. Soc. Ant. Scot.*, xxxvi. (1902) p. 209.

be much more troublesome than the smoke and ash produced by the burning of wood.

Whatever the fuel used, there is no doubt as to the manner in which the Mumrills oven was worked. A fire would be kept blazing in the interior, fanned by the prevailing, westerly, wind blowing along the flue, until the oven walls and dome had been heated to the required temperature. The fire would then be allowed to die down and the ashes be raked out by way of the flue, the raking out being facilitated by the smooth surface of the flagged floor. After the smoke and soot had dispersed, a baking pan or tray containing the bread or other material to be baked would be inserted. Chimney damper and furnace door would then be closed, and the baking be carried out by radiant heat from the oven walls. These must have been of considerable thickness to ensure the "solid" continuous heat essential to successful bread-making.¹ The chief disadvantage of this method of baking lay in the fact that the fire had to be rekindled and raked out again before every fresh batch of bread was baked.

In its general plan and in the way in which it was worked, the Mumrills oven resembled the circular baking-ovens commonly used in Roman forts. Well-preserved examples of these have been discovered at Mumrills itself,² at Balmuldy,³ Birrens,⁴ Inchtuthil,⁵ Fendoch,⁶ Malton,⁷ Castleshaw,⁸ and Cawthorn.⁹ It is worth noting that the oven found inside the fort at Mumrills, though similar in plan to that uncovered in 1941, differed from it considerably in construction. The former had been built of much smaller stones than the latter, and appeared to have had its walls lined with potsherds and broken tiles.

The Mumrills oven was, however, much smaller than the usual fort oven, measuring only $2\frac{1}{2}$ to 3 feet across internally instead of 5 to 7 feet. In this respect it resembled, for example, ovens found in the Annexe at Housesteads,¹⁰ outside the signal station at Goldsborough,¹¹ and in houses at Colliton Park, Dorchester, Dorset,¹² and Atworth, Wiltshire.¹³ These small ovens had clearly been intended to supply the needs of a smaller group of people than the fort ovens.

It is only reasonable to suppose that so useful an article of kitchen equipment as an oven would be made to serve other purposes besides that of bread-baking. The proximity of certain fort ovens to granaries, as at

¹ See W. Iago, *The Chemistry of Wheat, Flour and Bread, and Technology of Bread-making* (1886), pp. 319 ff.

² *Proc. Soc. Ant. Scot.*, lxiii. (1929) p. 499.

³ S. N. Miller, *The Roman Fort at Balmuldy* (1922), pp. 27, 31, 40.

⁴ *Loc. cit.*

⁵ *Loc. cit.*

⁶ *Loc. cit.*

⁷ *Loc. cit.*

⁸ I. A. Richmond, *Huddersfield in Roman Times* (1925), p. 55.

⁹ *Archaeological Journal*, lxxxix. (1932) p. 63.

¹⁰ *Archæologia Eliana*, 4th ser., ix. (1932) p. 230.

¹¹ *Archaeological Journal*, lxxxix. (1932) p. 211.

¹² *Proc. Dorset Nat. Hist. and Arch. Soc.*, 59, p. 12.

¹³ *Journal of Roman Studies*, xxix. (1939) p. 221.

Balmuikdy.¹ has suggested that one of their uses was that of roasting grain before grinding. Roman writers on agriculture do in fact tell us that it was the practice of their countrymen to harvest grain, particularly barley, before it was fully ripe, in order to prevent mildew, or damage by shaking or from animals' hooves, and then to parch it in the sun or roast it by fire before grinding.² Striking evidence for the practice of roasting grain in Britain has been provided by the discovery of charred wheat in a series of drying chambers at a Romano-British homestead at Hambledon, Buckinghamshire.³ Charred wheat has also been found on several other Roman sites, for example at Westerwood,⁴ although not, so far as seems to be recorded, inside an oven. The absence of charred grain inside an oven does not, however, discount the possibility that it may have been used on occasion for the roasting of grain. The grain would be placed in a receptacle of some kind before being inserted in the oven, and would, or should, all have been withdrawn after roasting.

The heat to which ovens were subjected necessitated their frequent repair or even reconstruction. One at least of the Fendoch ovens had been provided with a new floor,⁵ while an oven at Malton had been rebuilt several times.⁶ That the Mumrills oven, too, had undergone reconstruction was suggested by the fact that its north side had been laid on made-up soil, and by the discovery of a heavily burned sandstone under the large whinstone boulder. The sandstone must at one time have occupied a position nearer the source of heat.

It may be inferred that the oven belonged to the Antonine rather than to the Agricolan occupation of Mumrills, both from its proximity to the present surface and from the pottery found in it. This comprised one fragment of a Samian ware platter (form 18.31 or 31), sherds from three grey urns or ollæ, and from an olla of coarse fumed ware, one fragment from the rim of an olla of fine fumed ware (fig. 3, 1), and one from the rim of a bowl of fine fumed ware (fig. 3, 2). These were all common Antonine types.

The only other finds from the oven itself were the scrap of slag-like material already referred to, and a badly corroded fragment of iron.

A number of potsherds were also recovered from ground within a radius of twenty yards of the oven. These included one fragment of a decorated bowl of Samian ware (form 37). The decorated zone was divided into panels containing a caryatid (Déchelette 658 and Oswald 1203), a figure (Déchelette 265 and Oswald 450), the same caryatid and a medallion. In one panel the caryatid was replaced by the stamp of the Lezoux potter

¹ *Op. cit.*, p. 27.

² Columella, *De re rustica*, ii, 9; and Pliny, *Hist. Nat.*, xviii, 10, 11, 18, 20, 23, 30, 72.

³ *Archæologia*, lxxi. (1921) pp. 151 ff.

⁴ Macdonald, *The Roman Wall in Scotland* (1934), p. 256.

⁵ *Loc. cit.*

⁶ *Loc. cit.*

Albucius—ALBVCI—a stamp which has occurred before at Mumrills.¹ There were also sherds of two grey ollæ and one of fine fumed ware, and one fragment from the thick, sharply everted rim of a grey olla of hard, close-textured clay, with a girth groove on the shoulder (fig. 3, 3). This last

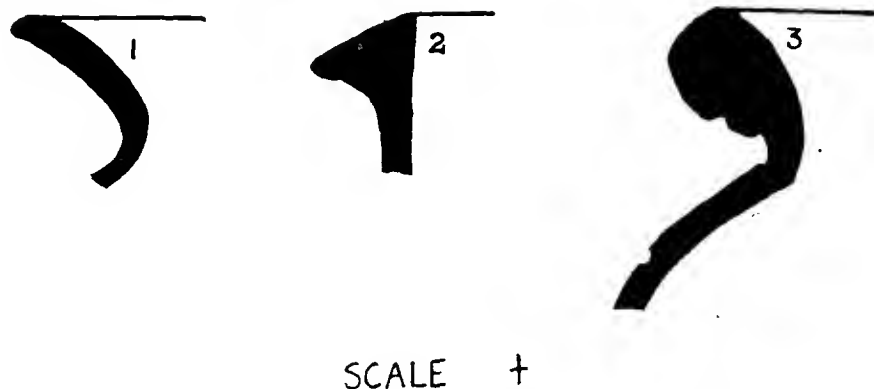


FIG. 3. Pot Rims from the Oven.

fragment was strongly reminiscent of first century types of ollæ, especially those bearing rustic decoration,² and may well be a relic of the Agricolan occupation.

The finds have been presented to the National Museum of Antiquities, Edinburgh, by Charles W. Forbes of Callendar, J.P., D.L., Callendar House, Falkirk.

APPENDIX.

SLAG FROM A ROMAN OVEN ON THE SITE OF THE FORT AT MUMRILLS, FALKIRK. By J. A. SMYTHIE, Ph.D., D.Sc.

The material is in the form of irregular, thin slabs or cakes, abounding in blow-holes and encrusted with red oxide of iron. When broken across, it is seen to be far from uniform, and surfaces ground, polished, and examined in reflected light show very imperfectly fused slag, with numerous blow-holes, and inclusions of unfused or imperfectly fused materials. The slag is neither glassy nor obviously crystalline, and the whole appearance is that of a fritted mass of diverse material.

I have endeavoured to isolate the slaggy constituents from the oxidised and unfused matter by crushing finely and selecting the portion passing the 30-mesh sieve, but stopped by the 80-mesh sieve. This, after thorough

¹ *Proc. Soc. Ant. Scot.*, lxin. (1929) p. 506, No. 12.

² Cp., for example, Jas. Curle, *The Roman Fort at Newstead* (1911), pl. xlv, 29; Thomas May, *Templebrough* (1922), pl. xxxii B, 205, 206; and P. Corder, *The Defences of the Roman Fort at Malton* (1930), fig. 17, No. 18.

washing and drying, consisted of dark-coloured extremely hard grains, almost free from red oxide and slightly magnetic. Partial analysis of this gave:

SiO ₂	40.75
Al ₂ O ₃ + TiO ₂	21.75
FeO	21.60
MgO	4.62
CaO	5.50
SO ₃	..
	<hr/>
	94.22
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Total iron is reckoned as ferrous oxide, and it is mostly present in this form. Heavy metals like lead and copper are absent: titanium was proved qualitatively to be present.

Having regard to the origin and age of the slag, it cannot be considered as a product of smelting iron ore in a blast furnace, and the high iron-content and low values for the fluxes (lime and magnesia) are in accord with this. On the other hand, it is not a typical bloomery slag, for in several analyses I have made of such slags, and in others quoted in Straker's *Wealden Iron*, ferrous oxide is of the order of 50 per cent., and lime and magnesia, and still more alumina, are much less in quantity.

I am inclined to think that it is a furnace-clinker, formed by the burning of coal. The temperature has obviously been fairly high, though not so high as in a smelting furnace, and the clinker represents the mineral matter in the coal. This has been essentially of a clayey nature and has probably also contained those ankeritic minerals (carbonates of iron, magnesia, and lime) which frequently occur in coal. The complete absence of sulphate is rather surprising, and indicates that the iron in the clinker has been all present in the ankerite, and none in pyrites.

NOTES.

1. TWO CISTS AT LUNANHEAD, FORFAR.

While excavating material from the sand-pit at Lunanhead, locally known as "The Dog's Knowe," on the Carse Gray estate, on Thursday, 4th September 1941, for the construction of a new aerodrome, the mechanical digger unearthed what afterwards proved to be a short cist of the Bronze Age. In spite of this being the site of other Bronze Age burials,¹ and of repeated requests to look out for similar discoveries, the importance of this find was not realised by those who happened to be in charge at the moment, so that the cist was broken up and the slabs dispatched to the aerodrome without examination of any kind. As an afterthought, however, the contents of the cist, consisting of the bones of a skeleton and some fragments of an urn, were collected and laid aside. The urn fragments, however, were abstracted, and a public appeal which I made for their return was, unfortunately, unsuccessful.

On hearing of this find, and the discovery of a second cist the following afternoon, I hastened to the site and arranged for the soil being cleared away and the cist carefully preserved, untouched, until the arrival of H.M. Inspector of Ancient Monuments, with whom I communicated at once. The soil surrounding the cist was carefully removed and the site cleared on Saturday, and steps were taken to preserve this second cist, but, on the arrival of Mr Richardson on Monday morning, we found that, in spite of all precautions, the cist had been interfered with during the temporary absence of the men, the front stone broken, the skull of the skeleton smashed, the bones disarranged, and the teeth removed. The teeth, however, were subsequently recovered with the aid of the police.

The contents of this second cist, as we found them, were carefully examined, and the fragments of the urn, and the skeleton which it contained, were removed for further examination, when it was found that the floor of the tomb had been laid with selected pebbles, methodically arranged, a somewhat unusual feature in Bronze Age burials. It is unfortunate that the destruction and removal of the first cist, without any opportunity of examining it, prevented our determining whether it was similarly floored. The failure to recover any portion of the urn in the first cist also prevents any comparison of the two urns.

The photographs of the second cist, which were kindly taken by Mr Moir, Agent of the Bank of Scotland, Forfar, show the arrangement of the pebble flooring of the cist, with the fractured slab lying in front of it. The photographs also show an indication of a circle, about 7 inches in diameter, on the back slab, but this may be a natural mark on the stone (Pl. XXIX, 2). The fractured slab in the foreground is the front slab of the cist, which was broken when the grave was interfered with, and damaged the skeleton in its fall. Fortunately, I had removed the fragments of the urn when the cist was first uncovered, and these were practically complete. They were reassembled by Mr Edwards, Director of the Museum, who favours me with the accompanying photograph of the completed urn (Pl. XXX, 1) and the following Report: "The beaker urn, which is made of a reddish-coloured clay, measures 8½ inches in height, 6½ inches in external diameter across the mouth, 6 inches in width at the bulge,

¹ *Proc. Soc. Ant. Scot.*, vol. xii. (1876-77) pp. 288-300.



1. Roman Oven at Mumrills.

A. S. ROBERTSON.



2. Cist II at Lumanhead.

JOHN T. EWEN.

To face p. 128.



1. The Beaker.



2

2. Skull from Cist I, restored, showing ulcer in frontal bone.



3

3. Right maxillary alveolar margin of jaw from Cist II, showing recession (pyorrhea) and abscess cavities at apices of roots of first molar.

and $3\frac{1}{2}$ inches in diameter at the base. The urn is decorated with three zones of impressed ornament, with plain zones between." The urn has been presented to the Museum by Mrs Gray Cheape of Carse Gray, Forfar, on whose ground it was found.

This second cist measured 3 feet 10 inches by 2 feet 8 inches outside, and 3 feet 3 inches by 2 feet 5 inches and 1 foot 6 inches inside, the longer sides lying north-east and south-west. The cover-stone, somewhat irregular in shape, is of great size and weight, measuring roughly 5 feet in length, by 2 feet 10 inches broad, and from 3 inches to 9 inches thick. It presented quite a problem in transport to its new position.

The skeleton which we found in this cist—that of a male adult, according to Professor Waterston—lay on the right side, in a "hunkering" position, with the knees towards the chest. The skull was near the east corner, and the beaker urn opposite it, in the north.

The stone slabs of this cist were carefully marked for position before their removal, and, instead of their being broken up like those of the former cist, Mr Laird, the lessee of "The Dog's Knowe," was good enough to let me have them, and to transport them, along with the heavy cover-stone, to Pitseandly, where the grave has been reconstructed within half a mile of its former site, with the cover-stone by its side. The original pebble flooring (the pebbles having been kindly collected for me) has been relaid in the cist, with the probable date of the burial, 1500? B.C., interpolated in white pebbles for the information of visitors to the cist in its new position.

The wonderfully complete set of bones which survived the demolition of the first discovered cist, and the less well-preserved skeleton which, under Mr Richardson's guidance and direction, we recovered from Cist No. 2, were forwarded to Professor Waterston, Bute Medical School, St Andrews University, who had kindly consented to examine and report upon them. Professor Waterston's interesting and valuable Report, embodying the results of his expert examination of the two skeletons, accompanies this account of the discoveries.

JOHN T. EWEN.

2. SUMMARY OF THE EXAMINATION OF SKELETONS FROM CISTS AT LUNANHEAD.

Cist No. 1.—Examination of the bones and fragments showed that the skeleton was that of a male of over forty years of age, 164 cm. in height (5 feet 4 inches), of average proportions, but with a short feminine type of chest, of slender build, with rather long forearms. The skull was large (198 mm. long) and capacious, the hinder part specially being large, high, and wide. His neck had been very stiff from osteo-arthritis, but his limbs had full range of movement. His customary posture was that of squatting. The teeth were good, much worn, with no decay. The upper left wisdom tooth and the right lower first premolar had been extracted in youth. He had suffered a deep wound on the left side of the forehead some time before death, which had involved the bone and left a suppurating sore.

Death had been caused by a deep wound on the front of the left thigh, inflicted by a sharp, heavy weapon which had cut deeply into the femur and had soon proved fatal.

Cist No. 2.—The remains were fewer and more fragmentary, but it could be established that the skeleton here also was male, and that the skull had been

similar in shape to that in Cist 1 though shorter (191 mm. long), and, from the condition of portions of the cranial sutures, was that of an older person.

Though most of the skull was in rather small fragments, the right maxillary alveolar arch was intact, carrying all its teeth except the central incisor and the second premolar, which had dropped out post-mortem; the right half of the mandible, also with its teeth *in situ*, except the incisors and the second molar which, also, had dropped out post-mortem. In addition there were a dozen loose teeth, from the arches of the left side. The teeth proved to be extremely instructive from the pathological standpoint (Pl. XXX. 2).

The teeth were of moderate size, and the crowns of the first molars and the teeth anterior to them were much worn, the tubercles worn away and the pulp cavities exposed and filled with secondary dentine. The crown of the second molar, on the other hand, was hardly worn, its lingual tubercle alone being slightly worn down. The crowns of the third molars (wisdom teeth) were quite unworn and in marked contrast with those of the first molars. There had been long-standing pyorrhœa, which had caused absorption of the outer walls of the sockets so that the whole length of the root of the upper canine, the labial root of the first premolar, and both the labial roots of the first molar were exposed on the surface. There were large carious cavities in the adjacent surfaces of the necks of the first molar and second premolar which undermined the masticating surfaces and eroded the secondary dentine which filled the pulp cavities. Above and round the apices of each of the labial roots of the first molar were smooth-walled abscess cavities. A small circular channel led from the lingual root of the first molar upwards and perforated the floor of the maxillary sinus, and from the condition of the tooth it is highly probable that there had been an infection of the sinus.

Interpretation of these pathological appearances leads to the conclusion that the teeth had been healthy and functioning normally, with the usual wear of the crowns, until after the eruption of the second molar tooth (twelve years) —sufficiently long to cause some wear of the crown of that tooth. But after that and before the appearance of the wisdom tooth (third molar) decay had begun at the neck of the second premolar and first molar, causing pain and so great tenderness that mastication had been impossible, and all further wear of the crowns was stopped, the wisdom teeth, though present, having undergone no wear at all. Pyorrhœa affected all the anterior teeth, and gumboils and abscesses had formed about the roots of the first molar. It is also probable that there had been an infection of the maxillary sinus.

In spite of all this the man had lived to over forty-five years of age. No cause of death from external violence was detectable.

DAVID WATERSTON.

3. LOCAL MANUFACTURE OF NEOLITHIC POTTERY.

The discovery at the Neolithic occupation site of Eilean an Tighe, North Cist, of kilns in which pottery had been manufactured on a considerable scale and over a substantial period of time was reported in a paper read before the Royal Anthropological Institute on 24th January 1939, and summarised in *Man*, vol. xxxix, p. 25. The similarity of the latest products of these kilns to pottery of the Unstan bowl type from Orkney, and particularly to a bowl from Rousay, suggested the possibility that the factory might have worked to

some degree for export, and it seemed desirable to test this possibility by petrological examination of sherds from North Uist and Orkney sites. Through the kindness of my friend Dr W. F. P. McIntock, Deputy Director of the Geological Survey, and of Dr J. Phemister, Petrologist to the Survey, fourteen sherds were examined as set out in the attached reports. Through the good offices of Professor Gordon Childe and Mr A. J. H. Edwards, sherds were made available for examination from sites in North Uist, Skye, the Orkneys, Aberdeenshire, and Luce Bay.

In Dr Phemister's opinion, which Dr McIntock shares, the evidence for local manufacture was in each case conclusive. The possibility of a Neolithic trade in pottery is naturally not excluded by the negative evidence of fourteen sherds, but it is rendered less likely. It is to be hoped that in future more extensive use may be made of the method of petrological analysis in the study of pottery; the efficacy of the method, which has been doubted, is conclusively shown by these reports.

W. LINDSAY SCOTT.

REPORT BY DR J. PHEMISTER ON SAMPLES OF NEOLITHIC POTTERY FROM SCOTTISH SITES.

Four Sherds from Eilean an Tighe Occupation Site, North Uist.—These are all of one type, showing fragments of quartz, quartz and microcline, quartz and oligoclase, microcline, hornblende, hornblende and feldspar (with and without quartz), sphene, epidote, and biotite. The latter five constituents are of small size and usually are present as single crystals, composite grains reaching not more than 0.8 mm. in length. They are derived from biotite-schist and epidotic hornblende-schist or hornblende-feldspar-rock, and appear to have been intentionally ground fine. The other rock constituents of the sherd are of variable size but reach 3.4 mm. in length. They are derived from granite or gneiss. All are derived from rocks native to North Uist.

Sherd from Tairverso Tuick Chambered Tomb, Rousay.—The fragments include both igneous and sedimentary rocks. The former comprise hornblende-lamprophyre (camptonitic), and an obscure fine-grained type which may be a marginal variety of the lamprophyre. The sediments include coarse and finer-grained micaceous flags with decomposed feldspar, and gritty micaceous mudstone. Quartz grains are numerous, and are of larger size than in the fragments of sediments. Presumably they were added as sand and not as crushed rock.

Igneous and sedimentary rocks of these types are usual in Rousay.

Sherd from Unstan Chambered Tomb, Loch Stenness, Orkney.—The fragments include both igneous and sedimentary rocks. The former comprise monchiquite, containing fresh olivine; iron impregnated feldspar; and an obscure felsitic or silicified rock containing prehnite. The sedimentary fragments comprise fine-grained sandstone, red flag, and mudstone. A small grain of a hornblende hornfels is present.

The main rock fragments, *i.e.* of monchiquite, sandstone, flagstone, and mudstone, are native to this area.

Sherd from Glenluce Occupation Site, Luce Bay.—The rock fragments in this specimen are small, and are mainly represented by fragments of single crystals. These are aggregated in some cases in such a manner as to suggest that sherds of earlier pottery were used as grog. Recognisable rock fragments include a microporphyritic rock of the andesitic or spilitic class; a small

fragment containing fresh augite and probably representing dolerite; quartzite; micaceous sandstone and gritty shale. Fragments which may be old sherds are composed of quartz, turbid plagioclase, fragments of felsitic and andesitic rocks and of hornblende-porphyrite, fragments of hornblende, augite, and epidote, all cemented by an opaque red-brown cement like that of the main sherd but of much less amount.

The rock material is not easily diagnosed owing to the smallness of the fragments, but the minerals and rocks seen could readily be derived from the sediments and igneous rocks found locally in place or as gravel.

J. PHEMISTER.

3rd February 1941.

SUPPLEMENTARY REPORT.

Sample 15. Chambered Tomb, Unival, North Uist.—The mineral fragments include quartz, microcline, oligoclase, hornblende, epidote, sphene, and the rock fragments show these minerals in combination as oligoclase-microcline-granite, epidotic hornblende-schist, and granular quartz-oligoclase-gneiss.

Sample 23. Chambered Tomb, Rudh'an Dunain, S.W. Skye.—The mineral fragments are mainly quartz, and subordinate plagioclase and augite. The rock fragments include feldspathic sandstone and tholeiitic basalt.

Sample 25. Chambered Tomb, Blackhammer, Rousay, Orkney.—In addition to quartz grains there are fragments of fine-grained argillaceous sandstone, quartzose sandstone, and flagstone.

Sample 27. Chambered Tomb, East Finneray, Duncacht, Aberdeen.—The mineral fragments are quartz, oligoclase, perthite, microcline, biotite, and subordinate hornblende. The rock fragments include biotite-granite with accessory hornblende, a fine-grained micropegmatitic dyke rock and a granular oligoclase-rock containing myrmekite.

Sample 32. Chambered Tomb, Rowiegar, Rousay, Orkney.—Contains, in addition to quartz grains, fragments of fine-grained sandstone or flagstone ranging from fairly siliceous to micaceous and ferruginous, and of a feldspathic biotite-lamprophyre.

Sample 34. Chambered Tomb, Unstan, Loch Striveness, Orkney.—Contains, in addition to quartz grains, fragments of gritty mudstone or shale, and fine-grained argillaceous sandstone or flagstone.

Sample 39. Chambered Tomb, Tairerso Thiek, Rousay, Orkney.—Contains, in addition to quartz grains, fragments of argillaceous micaceous sandstone or flagstone, and a few small fragments of micaceous feldspathic sandstone.

The assemblages in every case represent the local rocks, and the North Uist, Skye, Orkney, and Aberdeen assemblages are mutually distinct. This series of sections bears out our previous deduction that the grog for the pottery was obtained by crushing the rocks immediately to hand.

(Sgd.) J. PHEMISTER.

25th March 1941.



1 0 1 Inch



1 0 1 2 Inches

Three Bickers built of particoloured woods, presented by Miss Maria Stewart.

[To face page 133.

DONATIONS TO AND PURCHASES FOR THE MUSEUM,
1911-12.*Donations.*

(1) Beaker Urn of reddish clay, measuring $8\frac{1}{4}$ inches in height, $6\frac{1}{8}$ inches in external diameter across the mouth, 6 inches in width at the bulge, and $3\frac{1}{2}$ inches in diameter at the base, from a cist at Lumanhead, Pitseandly, Forfar. Presented by Mrs GRAY CHEAPE, Carse Gray, Forfar. (See Note 1, p. 128.)

(2) Polisher of micaceous schist with quartzite veins running through, from Shetland. Presented by E. J. F. CLAUSEN, F.S.A.Scot.

(3) Kirkealdy Trade Token issued by Thomas Ronald, Merchant, Kirkealdy: *Obv.* Thomas Ronald Merch^t Kirkealdy. *Rev.* Teas Wines & Groceries. Presented by Miss M. L. RUSSELL, Alburne Knowe, Markinch.

(4) Chinese armorial Plate with the arms of David Stuart Erskine, Earl of Buchan, who founded the Society of Antiquaries of Scotland in 1780. Glazed earthenware Jug with handle and small spout, sixteenth or seventeenth century, 8 inches in height. Presented by JAMES S. RICHARDSON, F.S.A.Scot.

(5) Spinning-wheel for flax or fine wool, from the parish of Southwick, Stewartry of Kirkcudbright: "Muckle Wheel" c. 150 years old: Wool Winder for use with a small spinning-wheel: Hand Winder for yarn, from St Kilda: Weaver's Candle-holder of iron, from Glenluce, Wigtownshire. Presented by The Most Hon. THE MARQUIONESS OF AILSA, Culzean Castle, Maybole.

(6) Two small Whetstones, one of quartzite and the other of micaceous sandstone, from Tents Muir: small Whetstone of quartzite, from Sutherland: flint Knife, $3\frac{1}{2}$ inches in length, from Blairgowrie, Perthshire. Presented by Miss I. MURIEL WILSON, 11 King's Place, Perth.

(7) A Cinerary Urn: an Axe-hammer of lava: an oval Bronze Blade: a bone Bead and three stones with smoothed edges. (See Communication, p. 79.) Presented by Rev. R. S. G. ANDERSON, B.D., F.S.A.Scot.

(8) Amulet, stone, with hole for suspension, from Wasbister, Sandwick, Orkney. Presented by WALTER G. GRANT of Trumland, F.S.A.Scot.

(9) Special Constable's Baton. Presented by JOHN GRANT, F.S.A.Scot.

(9) Four Bronze Age Halberds, from Auchingoul, Inverkeithny, Banffshire. Presented by T. E. A. GRIFFITH, Ferney Lee, Holmesfield, nr. Sheffield. (See Note, *Proceedings*, vol. lxxv, p. 208.)

(10) Circular Patch Box of wood: two-handled wooden Quaich: three wooden *Bickers* built of parti-coloured woods and hooped with withies (see Pl. XXX1): three Quizzing-Glasses, eighteenth century: three

Spinning Tops of wood; hexagonal bone Die or Playing-Piece: china Saucer bearing the arms of *Keith*. Earl Marischal of Scotland; circular Tablet of bone, on one side are the letters of the alphabet and the figures 1 to 9, and on the other side is inscribed "ANNE GOODIFF, 27 Little George Street, Hampstead Road." The date 1846 has been roughly scratched at the bottom, and at the top there is a hole for suspension; leather Case containing a folding Knife, Fork, and Spoon, also a Salt Holder, the case was used about 1850 or 1860 by James Steuart, who was a Private in the C.A. Coy. of The Queen's Edinburgh Rifles (Edinburgh Blacks). The maker's name on the case is W. & J. Milne, 33 Hanover Street, Edinburgh. Rolling-pin of blue glass having the figure of a ship and the motto *Forget me not*. Woollen Cap, knitted in Fair Isle colours and pattern in Orkney, about 1850. Woollen Pouch, knitted in Fair Isle colours and pattern in Shetland, about 1850. Smoker's Cap, knitted in silk in Shetland, about 1850. Knitted silk Purse with tassel, to match smoker's cap. Small single heart-shaped Brooch of silver. Large heart-shaped Brooch of silver, and a double heart-shaped Brooch of silver, inscribed on the back "I. C. 1829." Two adjustable wooden Stands for the raising or lowering of candlesticks. Presented by Miss MARIA STEUART, 2 Lynedoch Place, Edinburgh.

(11) Eight Communion Tokens. Presented by A. D. LACAILLE, F.S.A.Scot., F.S.A.

(12) Relics from a Lake-Dwelling or Cráinnog in Eadarloch, Loch Treig, Inverness-shire. Presented by Professor JAMES RITCHIE, M.A., D.Sc., F.R.S.E., F.S.A.Scot. (See Communication, p. 8.)

(13) Fragments of Roman Pottery found during the excavation of a Roman oven at Mumrills, Falkirk. Presented by CHARLES W. FORBES, Esq., of Callendar, J.P., D.L. (See Communication by Miss ANNE S. ROBERTSON, p. 119.)

(14) Twenty-six Communion Tokens. Presented by JOHN R. LOCKIE, F.S.A.Scot.

Purchases.

Portion of one side of a Viking Comb Case of bone, 2 $\frac{7}{8}$ inches in length, ornamented with incised lines.

Double-toothed Comb of bone, asymmetrical; the ends, one of which is incomplete, and are beaked, and are ornamented with a double circle and dot decoration; length, 3 $\frac{1}{8}$ inches.

Flat circular-headed Pin of bronze, the head ornamented on either side with three dots; length 2 $\frac{3}{4}$ inches.

All from Freswick Links.

DONATIONS TO AND PURCHASES FOR THE LIBRARY.
1941-42.

Donations.

(1) Prehistoric Scotland. Initial Chapters of an Unfinished Work. By Sir George Macdonald, K.C.B., LL.D., F.B.A., F.S.A.Scot. Edinburgh, 1940. Presented by LADY MACDONALD.

(2) The Monumental Brasses of Cheshire. By L. M. Angus-Butterworth, F.S.A.Scot. From *Transactions of the Lancashire and Cheshire Antiquarian Society*. Vol. lv. Presented by THE AUTHOR.

(3) Irish Castles and Castellated Houses. By Harold G. Leask. Dundalk, 1941. Presented by W. DOUGLAS SIMPSON, M.A., D.Litt., F.S.A.Scot.

(4) Two Unpublished Letters from James Graham to Sir Donald Mackay of Far. By Dr George Mackay. Reprinted from *The Juridical Review*, December 1941. Presented by THE AUTHOR.

(5) Lake District History. By W. G. Collingwood, M.A., F.S.A. Kendal, 1925.

The Morris Book. Part i., with a Description of Dances as performed by the Morris Men of England. By Cecil J. Sharp and Herbert C. Macilwaine. London, 1912.

Abbots Bromley in Mythological Light. Reprinted from *Man in India*, Vol. xxi., 1941, Nos. 2 and 3. By Mrs DOROTHEA CHAPLIN, F.S.A.Scot.

Presented by THE AUTHOR.

(6) Society of Friends of Dunblane Cathedral. 1941. Vol. iii., Part vi. Presented by The Right Rev. J. HUTCHINSON COCKBURN, D.D., F.S.A.Scot., the Moderator of the Church of Scotland.

(7) Antiquities: their Preservation and Restoration. Second Edition. London, 1932. and Ancient Egyptian Materials. By A. Lucas, O.B.E. London, 1926.

Peasants and Potters. The Corridors of Time. III. By Harold Peake and Herbert John Fleure. Oxford, 1927.

Ancient Stained and Painted Glass. By F. Sydney Eden. Cambridge, 1933.

Scots Ballads. Godlie and Ungodlie. By Richard the Rhymer. Glasgow, 1941. Printed for Private Circulation.

A Burns Handbook. By John D. Ross, LL.D., F.S.A.Scot. Stirling, 1931.

Colonsay and Oronsay in the Isles of Argyll. By John De Vere Loder.

Mediaeval Manners illustrated at the Cluny Museum. A Guidebook to the Rooms and Collections. By Edmond Haraucourt, Curator of the Cluny Museum.

Presented by ARTHUR J. H. EDWARDS, F.S.A.Scot., Director of the National Museum of Antiquities of Scotland.

(8) History of Mary Stuart, Queen of Scots. Translated from the Original and Unpublished MS. of Professor Petit, by Charles de Flandre, F.S.A.Scot. Vols. i. and ii. Edinburgh, 1873. Presented by Dr G. KEPPIE PATERSON.

(9) The Chronicle of Melrose, from the Cottonian Manuscript, Faustina, B IX, in the British Museum. With an Introduction by Alan Orr Anderson, B.A., LL.D., and an Index by William Croft Dickinson, M.A., D.Lit. London, 1936. Presented by THE COLLABORATORS.

(10) Hull Museum Publications: No. 192: Index (Nos. 145-191); Record of Additions (No. 212): Bronze Age Implements (in the Mortimer Museum, Hull). Presented by T. SHEPPARD, M.Sc., A.L.S.

(11) Egyptian Mummies. By Iain M. M. Maclean, F.S.A.Scot. Reprinted from *The Broad Way* (Westminster Hospital Gazette), Vol. R 8. Presented by THE AUTHOR.

(12) The Journal of the Manx Museum. Vol. v., No. 66, June 1942. Presented by THE TRUSTEES.

(13) Imagery in Early Celtic Art. The Sir John Rhys Memorial Lecture, British Academy, 1941. By Dr P. Jacobsthal. Presented by THE AUTHOR.

(14) Academical Dress. A Brief Sketch from the 12th to the 20th Century, with special reference to Doctors. By Charles A. H. Franklyn, M.D., M.R.C.S., F.S.A.Scot. Published in *The Medical World*, Vol. lvi., No. 24. Presented by THE AUTHOR.

Purchases.

Place Names of West Lothian. By Angus Macdonald, M.A., Ph.D. Edinburgh, 1901.

The Scots Year Book. 1941-42.

Christian Art in Ancient Ireland. Vol. ii. Edited by Joseph Raftery, M.A. Dublin, 1941.

New Bibliography of the County of Caithness. By John Mowat, F.S.A.Scot. Wick, 1940.

The Roads of Mediaeval Lauderdale. By R. P. Hardie. Edinburgh, 1942.

New Complete Russian-English Dictionary (New Orthography). Edited by Louis Segal, M.A., Ph.D. London, 1942.

MEETINGS OF THE SOCIETY.

Saturday, 31st January 1942. ALEXANDER O. CURLE, C.V.O., LL.D.,
Vice-President, in the Chair.

A Ballot having been taken, the following were elected Fellows: Miss Kate F. Stewart, B.A.; George W. Stronach.

The following Communications were read:—

- I. The Lake Dwelling or Crannog in Eadarloch, Loch Treig: its Traditions and Construction, by Professor JAMES RITCHIE, M.A., D.Sc., F.S.A.Scot. (*printed*, pp. 8-78).
- II. A Mural Painting and a Carved Door at Traquair House, Innerleithen, by G. P. H. WATSON, F.R.I.B.A., F.S.A.Scot., and A. GRAHAM, M.A., F.S.A.Scot., F.S.A. (*printed*, pp. 5-7).

Saturday, 28th February 1942. ALEXANDER O. CURLE, C.V.O., LL.D.,
Vice-President, in the Chair.

The following Communications were read:—

- I. Two Donside Castles, by W. DOUGLAS SIMPSON, M.A., D.Litt., F.S.A.Scot. (*printed*, pp. 93-102).
- II. Scottish Micro-Burins, by A. D. LACAILLE, F.S.A.Scot. (*printed*, pp. 103-119).
- III. Another Late Viking House at Freswick, Caithness, by Professor V. G. CHILDE, D.Litt., D.Sc., F.B.A., F.S.A.Scot., to be printed in vol. lxxvii.

Saturday, 28th March 1942. ALEXANDER O. CURLE, C.V.O., LL.D.,
Vice-President, in the Chair.

A Ballot having been taken, the following were elected Fellows: William McGlashan, Principal Lecturer in English and History, Training Centre, Aberdeen; Rev. Francis W. Peverelle.

The following Communications were read:—

- I. A Roman Oven at Murrills, Falkirk, by Miss ANNE S. ROBERTSON, M.A., F.S.A.Scot. (*printed*, pp. 119-127).
- II. A Cinerary Urn from Sandnuff Farm, Stranraer, Wigtownshire, by Rev. R. S. G. ANDERSON, B.D., F.S.A.Scot. (*printed*, pp. 79-83).
- III. Further Urns and Cremation Burials from Brackmont Mill, near Leuchars, Fife, by Professor V. GORDON CHILDE, D.Litt., D.Sc., F.S.A.Scot., and Professor DAVID WATERSTON, M.D., F.S.A.Scot. (*printed*, pp. 84-93).
- IV. Exhibition of a Woollen Fabric from Loch Treig, with Demonstration of the Weave, by JAMES RITCHIE, D.Sc., F.R.S.E., Professor of Natural History in the University of Edinburgh.

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